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PETROLEUM.

PETROLEUM AS A STEAM FUEL.

FROM THE PRACTICAL MECHANIC'S JOURNAL, MARCH, 1865.

Under the above title a cotemporary journal, "*The Engineer*," (27th January, 1865,) utters a decisive condemnation of liquid fuels for steam navigation. The article, a leader, is powerful in the way of ascertion, and, beyond measure, severe in its strictures on those who are here unorthodox in its eyes, all of whom are classed amongst those "who dabble a little in the laws of nature, and possess the unenviable notoriety of being amongst the most credulous of mankind. The man who seriously proposes to substitute liquid for solid coal as steamship fuel is, according to the writer, only worthy to be classed amongst the alchemists, if even his moral condition would entitle him to keep company with that very harmless class of enthusiasts, supposing any such to be in existence.

We must say this article seems to us written with much less than the usual discretion and ability of *The Engineer*, and to be one calculated to obstruct progress. It does not even cross the threshold of the real questions, upon the issue of which depends the success or otherwise of the attempts that will, notwithstanding its denunciations, be made to ascertain whether or not it be a fact, that real and great advantages must accrue whenever the means shall have become practically perfect for using liquid fuel for steam navigation.

It is nothing in point to urge that "dabblers in science" have attributed fabulous heating powers to petroleum, or other analogous liquid fuels. We are quite content to accept for the moment as approximately true the estimate of heating power given by the writer in *The Engineer*, and to assume that petroleum consists of about 85 carbon and 15 hydrogen by weight, and that steam coal, on the average, may be taken at 80 carbon and 5 hydrogen.

We are also willing, for the moment, to suppose that the estimate is correct as to the heating power of fuel, based on the premises that the combustion of one lb. one pure carbon is equivalent to 11-194 000 foot ponuds, and that that of an equal weight of hydrogen is four times as much. We are not to be understood as pledging ourselves to any of these, figures, especially the last, which we deem largely below the truth. We simply take these data for the moment as presented to us, and accept *The Engineer's* conclusion from them—that the heating power of equal weights of petroleum and of coal are as 162 to 115 nearly, or as 1·4 to 1. This assumes, of course, that in both cases the combustion is absolutely perfect.

This alone does seem to us rather a striking *prima facie* case in favor of the petroleum—that its absolute heating power is admittedly nearly once and a half that of an equal weight of coal. But we have some elements to take into view before any such comparison can be practically even near the truth.

Petroleum may be viewed as simply a hydro-carbon; as *The Engineer* fairly puts it, 85 carbon + 15 hydrogen = 100. But the steam coal, as also fairly put by the writer, at 80 carbon + 5 hydrogen = 85, contains of oxygen, nitrogen, sulpher, and mainly ashes, no less than 15 per cent.

Now, no one will affirm that these incombustible parts are of any service whatever in the fire, although, if we burn coal, we cannot keep them out of the grate; hence, we must deduct at once fifteen per cent. of the absolute heating power in order to get the practical heating value of the coal. This would bring the relative heating values of the petroleum and coal to the ratio of 1·6 : 1. But there is a further correction. This 15 per cent. of ashes and inert matter in the steam coal, is not simply so much useless or inert material put on board and carried about—It is 15 per cent. of positively hurtful and waste producing material, inasmuch as the whole of it must be heated up to the temperature of the furnace, and thrown off at that of the chimney; and to so heat it up, a certain increased portion of the otherwise available fuel must be burnt, just as in consuming wet wood one portion of the mass is burnt merely to evaporate the water out of the rest, and bring it to a state to burn and evolve its heat.

Now, dealing with the rough figures that we have here commenced with, it is not worth while to attempt any exactness as to how much of the 85 per cent. of real fuel in 100 lbs. of steam coal must be consumed to heat up to, say 2000° Fahrenheit, the 15 per cent. of rubbish it contains, very little of which ever comes back to the boiler. But, even when we shall have got this element into figures, we are not done with the coal. From the inevitable conditions of its combustion upon the set of grate bars, no precaution, no construction, can prevent more or less of the fuel dropping through into the ash-pit in an unconsumed state, either as small coal, as coal dust, or as small cokes. These get mixed up with the ashes, i. e., the really earthly contents of the fuel, and are with them thrown overboard.

We have, however, over and above all this, the losses produced by the imperfect combustion of the coal, and its sublimation, into the states of black soot and volatile oils (quite of the nature of petroleum) which fly up the funnel.

From the last three sources of loss, and others due to coaling and stowage, &c., together, the est mate recently given in the discussion of Captain Selwyn's paper on petroleum fuel, read at the United Service Institution, namely, that out of every five tons of steam coal purchased to put on board, only four tons are really utilized, is one probably not materially in error. If this be so, we are here comparing one fuel, (the liquid,) in which we will at present assume there is no waste, with the other, upon which there is a waste of one-fifth, so may at once add one-fifth to the absolute heating power of the petroleum, as represented then its practical efficiency as compared with coal. We then have, in relative value as fuel, petroleum : coal : 2·63 : 1·00, or for equal effects.

Let us now come to the question of stowage. *The Engineer* admits 48 cubic feet for the ton of coal, and 44 cubic feet for the ton of petroleum. Accepting again these data, we find that equal bulks of petroleum and of coal, when stowed on board, will produce useful effects as fuel, in the ratio of 1·83 : 100. In other words, heating power and stowage considered together, the petroleum is nearly twice the value of coal for steam navigation.

But we are not done yet with the comparison. As the tonage of any steamship is a constant quantity, whatever we save in stowage of fuel may be devoted to stowage of cargo, and thus we may either increase our power and our speed in a ratio approaching that of 1·83 to 1·00, or, at the old power and speed, we may stow additional cargo to the extent of about one-half of the bulk of the original coal bunkers. This will be paying cargo, and as a result, we must carry to the credit of the petroleum a still further augmentation of its figure of value, the precise amount of which can only be determined by the conditions, mercantile and otherwise, of any given example.

We have deduced everything thus from the data admitted by the writer in *The Engineer*, and we are quite content with the result. Were we, however, to proceed to what we should deem a precise and trustworthy comparison, upon more exact data, the case would assume even more favorable conditions as respects liquid fuel.

We have said that we have assumed no waste with liquid fuel. We have rightly done so, for with such fuel waste is impossible. It must be perfectly burnt, or accidents must result. It must not be spilled about or lost, or leaked away for the very same reason.

It thus becomes quite absurd and beside the point to make objection to the future practicability of using this liquid fuel, based on the assumption that it is to be stowed in our existing construction of ships, and burnt in our existing tyges of boilers and furnaces. Nor is this a question that admits of being justly considered upon the basin of mere theoretic proportionate value of petroleum and of coal. It is eminently a practical question, and, like all such questions, is full of compromises and conditions balancing and affecting each other, the total of which must be taken into account Thus, for example, a steamboat running short trips, with intervals of rest, can at present do no more than bank the fires, and cover the funnel top in such intervals, but the mass of fuel is alight, and, do what we may, will slowly consume, or go out altogether. If petroleum be the fuel, the flame can be shut off like a gas-light, or brought to a point only just to keep up steam. Here may be great economy; here may be advantages for war purposes scarce calculable, yet this is but an adventitious condition affecting differently the two fuels, whether they are relatively, *per se*, theoretically good or bad.

The stowage of petroleum must be in cells—not tanks—formed between an inner and outer skin of the bottom of iron ships, and divided by the continuous keelsons, and by several cross diaphragms. No practical engineer can be found who will deny the perfect facility with which such cells can be made vapor tight, even against a considerable tension; nor that any mechanical difficulties will be experienced in providing these with valves and cocks, &c., by which each can be filled and emptied separately if desired; and with the means of knowing precisely the volume, temperature, and state of the liquid within each, without access to or opening into the interior. Whether such closed cells be quite full or nearly empty, or whether their contents be churned or shaken up by the most heavily pitching or rolling ship or not, matter nothing.

The petroleum must be pumped in, or passed in any case through appropriate mains; and to make it available as fuel on board, measured volumes of it must be continually pumped out, and delivered at the point of

combustion. Arrived there, it must be met by measured volumes of air, whose current through the flues and up the funnel must never intermit. In one word, the petroleum brought into a state of vapor must, at the point of ignition, be brought into contact with the requisite volume of air; and the combustion must be perfect—devoid of all smoke, like the flame of a well-trimmed naphtha lamp, and equally devoid of waste, by being mixed with a needless volume of air.

To affect these conditions, it is scarcely necessary to say that our present types of marine boilers are wholly unsuited. No alterations possible on existing boilers will meet all the requirements; for special apparatus is required, not only for the combustion of a fuel, the whole of which will disappear in flame, but for the absorption of the intense heat poured forth with great rapidity by this flame.

Marine boilers for the economical consumption of petroleum fuel, must be contrived that shall admit of the entire leng'h of these flues or tubes—from the first combustion point to the base of the funnel being constantly filled with a brilliant and intense flame, and the water spaces, etc., must be so arranged as to permit free escape to the increased volumes of steam that will be delivered from surfaces thus rapidly receptive of heat.

The temperature of hydro-carbon flame, when perfect, is probably not inferior to that of the ignited solid fuel in the marine boiler furnace, if not superior to it. There will be a vast difference in steam producing power, within the same total bulk of marine boiler, between the best existing types, in which the gases of the fires meander through the soot and dust-lined flues and tubes at an average temperature of only about a low red heat at best, and a new type, constructed with great receptive surfaces, always rigidly clean, and free from jacketting inside with soot or dust, and filled with flame from end to end, as bright and hot as that of an oil gas argand burner.

This is a thing of the future, no doubt, but it presents nothing impracticable, because nothing contrary to natures's laws; nor does its accomplishment present anything like the difficulties that beset every attempt to "consume smoke" from coal on board steamships. To effect this, real difficulties are imposed by the very nature of the solid fuel, and the necessity of passing through it an enormous and unmeasured volume of air, which have no existence in respect of liquid fuel.

In the very rough comparison of effective value we have made, based upon our respected cotemporary's data, we have not alluded to the enormously better boilers for economizing heat, that liquid fuel will not only admit of, but compel. At present every part of flue or tube must not only be so circumstanced that it can be got at for repair; it must be also capable of being swept ot brushed free of soot and ashes. The draft, as at present produced by a low funnel, almost always inadequate to perfect combustion of coal fuel, involves likewise large flue or tube areas, the surfaces of which are always sullied, so as to be bad asorbers of heat.

Except as respects capability of repairs, all these arrangements may be changed; and with surface condensation and fresh water in the boilers, the construction of the latter may take the type of the locomotive, with enormous and most effective expansion of tube surface. Artificial drafts, however produced, will be found, we think, indispensable; and as a result, the existing huge, lumbering funnels, rising 30 or 40 feet above the deck, will disappear, and their place be supplied by comparitively small tubes, just enough to emit the transparent water vapor, carbonic acid and nitrogen, which will constitute the bulk of the evolved products of the combustion. These tubes need not rise above the deck higher than shall carry these vapors or gases clear of persons on deck. There will be no smoke.

Hitherto we have alluded only to the advantages in a mercantile sense, consequent upon the successful use of liquid fuel for steam navigation. For purposes of naval warfare, however, its advantages can scarcely be at present fully foreseen.

If liquid fuel be weight for weight about twice the efficient value of coal, then a blockading steamship can keep her post off an enemy's coast twice as long without replenishment, using such fuel, as if she used coal, or, she can make twice as long an ocean run as with coal. No column of smoke streaking the horison will tell of her presence, before she desires, to an enemy watching to escape.

We have used the word petroleum throughout here, because shortly it expresses, though badly, what we are treating of.

We look however to the future of liquid fuel taking its supply, not from natural oil wells, or at least not from these alone, but from liquid hydro-carbons, to be artificially produced by the distillation at low temperatures (not exceeding a low red heat) of the very worst and most worthless refuse small coal of our coal fields. Fuel thus at present absolutely and heedlessly wasted such as the mountains of small coal and dust at the pit-heads of most of the northern collieries, will become convertible in part into a combustible of the highess value, and of the greatest portability. We have no doubt, too, that in the time to come, though yet a distant one, means, the general nature of which we can even already discern, will be devised by which our very thinest seams of coal, such as those of Staffordshire, that are to thin to bear the cost of working at all, by ordinary methods, shall be so arranged that by their own slow combustion *in situ*, when once set alight, and supplied in proper air courses and galleries by downcast shafts with suitable volumes of air, they shall evolve at the mouths of upcasts immense volumes of hydro-carbon vapors, only requiring condensation to fit them for liquid fuel.

To the savage man, fuel of any sort, or its use, are incomprehensible mysteries; to a not very remote generation of our own ancestors, coal, as a substitute for wood or peat, was held a mischievous and deleterious refinement; to some at the present moment, the substitution of liquid coal (for what is petroleum but that minus a little carbon?) presents itself as an equally absurd and preposterous, because new, attempt. Yet we venture to predict that a not very distant age will see coal as fuel employed in no other shapes, but after preparation, and either as liquid hydro-carbon distilled from the raw coal, or as carbonic oxide and other combustible gases produced from it, and used alone as fuel, by methods analgous to those of Mr. Charles Siemens. —Ed.

MINING.

THE MINERAL PRODUCTS OF GREECE.

Sir.—The working of metalliferous mines and metallurgical operations occupied the attention of the ancient Grecians at an early period. Towards the 70th Olympiad silver was extracted from the mines of Laurium, situated in Attica; gold was found in Thessaly, silver and gold in the island of Siphnos, silver in Epirus and the isle of Cyprus, and the same metals in Macedonia (in the Pangean mountains) and in Thrace. The most considerable gold mines were those in Macedonia, to the east of Leopta-Hyla, they are said to have been worked by the Phoenicians, afterwards by the inhabitants of the island of Thasos, before the conquest of the isle by the Athenians. These auriferous beds, in the neighborhood of Leopta-Hyla, are said to have yielded an annual product worth 17,600*l*. Those of the isle of Thasos were comparatively the least productive, but, united to what was derived from the mines which the inhabitants of the island posessed on terra firma the yield was estimated at 44,000*l*. to 65,000*l* yearly. According to Herodotus this was the amount of produce of all the mines to the west of Macedonia. According to some authors the value of the mines in this part of Greece amounted, during the reign of Philip of Macedonia, to 220,000*l*. The silver mines of Laurium are said to have furnished a good yield in the time of Themistocles; it was from resources furnished from these celebrated mines of Attica that this great man was enabled to place the Athenian maritime forces on such a warlike footing. These mines became less productive in the time of Socrates and Xenophon, and during that of Strabo were so barren that the works were confined to the reduc ion of ancient scoriae. The Journal des Mines of June 23, 1864, informs us that a French company have lately obtained from the Greek Government the authorisation to exploit the masses of scoria discovered in the valleys of Mount Laurium.

Ancient Greece posessed besides mines of precious metals those yielding other metals, such as iron, copper, and lead, particularly in Epirus, Macedonia, Thessaly, and Thrace; but the activity of the Greeks in mining industry declined under the dominion of the Romans, and became finally extinct under the yoke of Mahometism.

In the newly-constituted kingdom of Greece the development of the mineral and manufacturing resources has been but slow; industry has not marched with the same pace as agriculture in a country newly franchised, tormented with civil war, and burdened with a heavy debt. The industrial works, in order to be carried out properly, especially in the working of mines, would require in Greece capital and population of greater extent than the whole country is able to furnish.

The Greeks, especially in the Peleponnessus, are partial to agricultural pursuits, the soil being very fertile, though in 1857 the want of laboring hands raised the average of wages to 50 drachmas (drachma—0·864d.), or 3s. 6d. of our money, per day, the average wages being 23d. per day. During the same period according to the report of the Greek Minister of Finance, the interests of capital amounted to the enormous figure of 20 per cent.; the roads were in a neglected state, the Bavarian dynasty having in 30 years created only 26 miles of roadway. As to the working of mines, the default of legal guarantee to speculators not only kept strangers aloof, but caused the few native capitalists who could be disposed of to place their funds in other branches of manufacture, in which they embarked, in 1857, notwithstanding the high price of labor, a sum equal to half a million sterling.

According to the various reports published up to 1863, the following seems to be the state of industry and manufactures at that period. Two or three silk factories at Calamata and at Athens; at Athens, 15 printing offices, a paper factory, and a type foundry, a steam flour-mill, an establishment of gas works; at Pireus, two printing offices, an iron foundry, a steam mill, spinning works, and a furniture manufactory; at Kyphissia, the important wine, spirit, and vinegar works of M. Yarkandas; in the Pelopomessus, at Patros, silk spinning works, liquorice works, two printing offices, establishments of the Vinicole Company, and extensive ship yards; Galaxidi, ship yards; Nauplia, two printing offices and tan-yard; at Tripolitza, a printing office and establishments of the Matinea Wine Company; a printing office at Sparta, and another at Lamia; In Livadia, cotton ginning works; at Missolonghi, manufactories of looms for home weaving. In the islands, Lyra, beside the extensive ship yards, contains four printing offices, a steam-engine factory, and manufactories of lucifer matches and playing cards; Chalcis, a printing office, Coumi, in Eubea, looms for weaving silk ganze, Timos and Santarin, establishments of Malvoisie and other wines exported to Russia. Lastly, a concession has just been granted to a company for the drainage of Lake Kutais, and for the establishment of cotton cultivation on its site, and several other new industrial works.

On the restoration of the Hellenic nation, the portions richest in mineral deposits, Thessala, the Epirus, Macedonia, and Thrace, forming an integral part of the Ottoman dominions, the mining industry of Greece offers at present but a limited field for research. Yet by social improvements and a more economic administration the industry can take a rank which, though not important among nations, will lessen the amount of dependence upon other countries for mineral produce.

The following is a summary of the metallic mines in Greece proper:—Gold has been found in the island or Syros; at St. Sostes, in the island of Siphnos; at Na

xos, in the commune of Tragea; near Agapi, in the isle of Timos; the rivulets of the isle of Cyprus, which flow into the sea between the capes Trapani and St. Epiphanus, roll pellets of gold.

Traces of silver have been found at Siphnos and Zea and of mercury in the ancient mines of Laurium, but they are not worked. Zea contains argentiferous galena; some specimens have been submitted to analysis by M. Sauvage, engineer of mines, and the results show that the ore, without being one of the richest character, contains enough lead and silver to render the extraction profitable. He found that 100 kilos. (2205 lbs.) of lead from Zea gave an ingot of silver worth 1*l*., from which must be deducted the cost of cupellation, &c. According to the report of M. Laconte, who traveled to Zea in 1846, the working of these mines was attended with no difficulty, and their proximity to the sea gave them favorable advantages as to transport. Argentiferous galena is also found in Seriphos, near Montoula; in Timos, near Pyrgos, and in Laurium, also at Chalcidica, and near Gxomeria, in Andros; in the Lanarca district, and near Mount Olympus: also at Zagora, near Saloniea, in Thessaly. In several places throughout Greece there exists quantities of ancient plumbo-argentiferous scoriae that can be worked with profit.

Copper exists near the village of Clima, in the island of Soopelos, and near those of Lastova and Microcha rio, in Eurytania; at Charisto; in the Laurium; near Pyrgos, in the isle of Timos; in Milo, near the village of Phouviavounion; at Olympia, near Andritzena; in the peninsula of Chalcidica; in the Negropont.

Iron is found in abundance in the Peloponnessus, the Hellada, and the islands; according to M. Albert Gautry, author of the article "Greece" in the Annales du Commerce Exterieur (number for May, 1857), iron is particularly fonnd in the following places:—Mistra, near Sparta; Doliona; Vervena, near Halos-Petros Gythium, in Laconia; near Lake Copais; Ports Therico and Megalo-Peuki, in the Laurium; Cape Chili, in Negropont; Chalcis, Couvi, Carrysto, Zea, Kythnos, Seriphos, Siphnos, Syros, and Andros. C. H. D.

COAL, ITS USE AND ABUSE.

A series of interesting experiments, "On the Use and Abuse of Coal in our Manufactories," has been made by Mr. Lewis Thompson, M.R.C.S., and from his communication to "Newton's London Journal," he seems to have discovered that practically at this moment in our manufactories with a kind of coal capable of converting 16 times its weight of water into steam, only 6 lbs. of steam are raised per pound of coal consumed; in other words, more than one-half of the coal burnt under our steam-boilers is thrown into the air and lost. This assertion is based upon the daily working of several different steam-boilers in London, Liverpool, Manchester, Newcastle-on-Tyne, and Glascow. Mr. Thompson has come to the general conclusion that, except immediately after a charge of coal, the air from a well-fed furnace contains no appreciable amount of hydrogen, or hydrocarbon, or sulphurous acid; that the quantity of carbonic acid gas is abont 6 per cent., the quantity of oxygen gas about 9 per cent., and the quantity of carbonic oxide gas about 8 per cent., thus leaving us to infer that about 9 per cent. of the oxygen in atmospheric air is consumed by the hydrogen of the coal. Hence it appears that, in respect to the production of heat in furnaces, 9 parts of the oxygen of the air escape unacted on; and of the remaining 12 parts 6 are converted into carbonbonic acid, 2 combine with the hydrogen to form water, and 4 are carried off in the shape of carbonic oxide gas. Upon these data he states that the heat given out by coal is thus distributed—usefully employed in raising steam, 46 2-3 per cent.; loss from carbonic oxide gas, 41 2-3 per cent.; and loss from radiation and imperfect conduction, 11 2-3 per cent, We have employed percentages as more generally intelligible than the fractions of a semi-circle expressed in degrees, according to which Mr. Thompson calculates. An improved steam-boiler furnace has been invented by Mr. Thompson for preventing the loss.

THE COPPER SMOKE QUESTION.

In connection with the utilisation of copper smoke there is one important point which has been to a great extent overlooked—the economising of the fuel by which that smoke is made; and in all the improvements which have been proposed no one has, until now, proposed to do more than make each calciner do its own work. Mr. Arthur Bankart, however, proposes so to arrange his calciners as to economise fuel, and at the same time extract every particle of copper or sulphur contained in the ore. To ensure the introduction of an invention, and to lead to reasonable hopes that such introduction will be attended with success, it is desirable that the inventor should be thoroughly acquainted with the processes at present in use, and that he should well have kept in view the utilisation, as far as possible, of existing constructions. An arrangement of calciners in which these circumstances have been carefully attended to has just been patented by Mr. Arthur Bankart, of Braughing, Herts, who claims that he can purify the noxious gases in a simple manner after the sulphuric acid has been obtained, and the coal smoke never touches the ore. One great recomendation of Mr. Bankart's process is that the ore does not require to be ground, but can be as easily calcined in the usual state by this method as by the ordinary one; it, therefore, does away with the necessity of having extra plant for grinding. Besides this, he remarks that with his arrangement one furnace heats completely three calciners; the block of nine calciners and boiler are heated by three furnaces; and, he arranges for one man to attend to the three fires and boiler, and five men to the calciners, thus a saving of two-thirds of the consumption of fuel and half the labor is effected, which is a considerable item; and another advantage is that the workmen have nothing new to learn in this method of calcining over the ordinary one. Another advantage, not to be lost sight of, is that by this arrangement only half the number of walls is necessary; and all the fires verging into one stack, a vast saving is effected in the first construction of the block; and the walls being of cast-iron, perforated—each wall in one or two pieces, as the case may be—it very materially lessens thereby the expense in repairing, as the walls have only to be lifted out of their places, and replaced by fresh ones. Cast-iron walls will last nearly, if not quite, as long as the brick linings of the present calciners, whilst the worn-out walls are readily saleable as old iron, as they never touch melted metal; worn-out bricks, on the contrary, are worthless.

In describing his invention he states that a block of nine calciners and three furnaces, to be built coffin-shaped, with feet to centre, so that the flues shall be arranged in order that the copper smoke shall pass direct into the retort, and the carbonic acid and colouring matter in the coal smoke shall pass by itself from the fire compartment into the stack, and thence into the atmosphere, so that the products are in no way injured or discoloured. Over one of the furnaces he places a boiler, and conducts a steam-pipe down the outside of the furnace, under the fire vault, through the centre of the cast-iron flue, in the middle of the block, level with its surface, for creating sufficient draught to drive the copper smoke though the retort. There is sufficient draught to carry the coal smoke by means of the stack. The floor of the calciner is of cast-iron plates, lapping on each other by halves, so that an even surface is presented, and rests on the ledges arranged for that purpose, on the cast-iron perforated walls. The trap-doors for rabbling the calcined ores into the vault are iron boxes, fixed flush with the calciner floor, through the floor of the fire compartment, so that there is an uninterrupted exit for the ore from the calciner floor straight to the vault. The floor of the fire compartment rests on the vaults. The furnace is so arranged that on either side there is a cast-iron cheek 2½ in. thick, the whole length of the furnace, rising sufficiently high to form a good bed of fire, and placed 8 in. away from the upper-walls. These upper walls are of cast-iron, solid, to prevent the fire from playing into the calciner.

The fire passes down the sides of the solid walls, through the perforated walls of the fire compartment under each calciner, the fire always passing under the centre calciner before finding its way into the stack, through a flue under that calciner. The retort is formed of iron, the size of the flue at one end, and gradually lessens as it approaches the worm; it should be from 20 to 30 ft. in length, but its actual length will greatly depend on the height of the water for cooling the worm, as if the water comes from a height it will not be required to be so long as if it came from the level ground. The steam and copper smoke pass through the retort to the worm, where they condense in the shape of sulphuric acid, and the uncondensible gases, such as sulphuretted hydrogen and sulphurous acid, pass from last coil but one of the worm through a pipe into a cast-iron box by the side of the worm tank, fitted with a lid, which can be fastened on and removed at pleasure. This box is filled with oxide of iron, which completely holds in subjection the above gases, exactly on the principle of purifying coal gas, which is by far the simplest plan, as by applying the usual litmus, or other test-papers, to the top on the lid it is at once ascertained if the purifier is too highly charged to purify any more, in which case the lid is removed, and the oxide of iron taken out, the box being refilled with fresh, and the lid fastened on again. The foul oxide is placed in a heap under a shed, exposed to the air, where it readily heats of itself, and throws off everything perfectly innocuously, and in a few days it is ready to be used again. The gases are so completely held in subjection in the purifier that no smell whatever would be detected from the pipe near its surface. The sulphuric acid drains from the worm into a leaden tank just under it, from which it is drawn off.

In case the worm should ever foul by the small particles of copper or arsenic lodging, it is arranged that the steam should be cut off from the boiler into the retort; and the cock of the steam-pipe, on its first coil, should be turned on, by which the full power of the steam is used as a cleanser, driving everything before it into the tank or other receptacle. Mr. Bankart has also arranged, that when the ore is finished calcining, and has been drawn through the traps into the vaults, and when water has been thrown on it as is usual; that the noxious gases, which are evolved in considerable quantities, are carried off by the means of a flue at the foot of the vault, in the centre calciner flue, where it passes into the retort with the copper smoke. This vault flue is fitted with a door, with a strong spring, with a handle from the door extending to outside of vault, with a hitch by means of which it fastens when the vault is clear, the man lifts the handle, and the door springs back again and closes the flue. The worm is of earthenware, the diameter of the pipe being 9 in. and that of the coil 4 feet; and as it is proposed to have five coils, there would be about 200 feet of cooling surface for condensing the smoke and steam. The quantity of steam used is only just sufficient to create a draught for the smoke through the comparatively small aperture of the retort, so that the steam is thoroughly impregnated with the sulphuric acid under the most favorable circumstances.

AFTER THE WAR, THE MINES.

This was the policy of President Lincoln, and in keeping with this we find our generals making reports from the motalliferous districts, and disbanded soldiers, Federal and Confederate, delving for the metals. In the old gold districts of Virginia the scene of the battles between Lee and his Federal opponents, there is a return to the gold searchings of other days. More than two million dollars of gold were obtained in the past from Culpepper, Louisa, Goochland, Orange, Spottsylvania, Fluvanna, Buckingham, Prince Edward, and other and neighboring counties of Virginia, and since the Rebellion closed hundreds of former Confedreate soldiers having engaged in washing the gold deposits. It is stated that about two thousand of such miners are now at work in Louisa and Goochland counties, and that the average is two pennyweights a day to each miner. Some of the quartz is crushed with stone and iron mortars.

Regular quartz mining is also to go forward. Mr. Wickoff, owner of the Melvin gold mine, on Rapidan river, has returned from the North with seventy-five mechanics and miners, and is getting to work. The company owning the Whrte Hall gold mines are resuming work with one hundred hands, and are about erecting a stamp mill building, and contemplate having thirty stamps in operation soon.

The Appalachian gold fields are on the eastern flank of the mountains; the western flank has not been found auriferous. On the east there are flexures and displacements which bring the older rocks of the Appalachian system to the surface, while on the west the carboniferous strata reposes comparatively undisturbed.—*American Exchange and Review.*

GAS.

THE GAS EXPLOSION AT NINE ELMS.

It has long been received as an axiom by gas engineers that a gas-holder cannot explode, and in accordance with that belief, numerous arguments have been promulgated to account for the disastrous calamity at Nine Elms, without the necessity of acknowledging that the explosion was really and primarily in the gas-holder which was blown to pieces.

The facts of the case appear to be as follows:—Gasholder No. 1,—150 feet in diameter, and 60 feet in height was exploded, and some fragment projected by the shock penetrated gas-holder No. 2, and the escaping gas from that holder took fire. Each of the gasholders being at the time of the accident charged with about 1,000,000 cubic feet of gas. The retort houses wherein is made the gas supplied to these holders, consist of three buildings 60 feet wide, and 194 feet in length, cantaining 480 retorts, and being capable of generating in the aggregate about 4,300,000 cubic feet of gas per diem. The meter and governor house containing also various offices and testing rooms was entirely demolished, notwithstanding that it was a very substantial building, but the meter although much damaged remained standing.

Upon the visit of the directors and some of the share holders to the calamity, the opinion put forward as to the cause of the disaster, was that an explosion first occured in the meter house, the force of which burst the side of gasholder No. 1., igniting its contents, the flames from which, then burst through the top of the gasholder.

We are of the opinion that this is utterly inaccenrate and believe that a very brief consideration of the facts which were evident at the time of the accident, and of the condition of the debris afterwards, will prove that the explanation thus given of the matter assumes the existence of a state of affairs almost impossible, and in fact, it is difficult to conceive what can have prompted such a view of the case, except the foregone conclusion that a gasholder cannot be exploded under circumstances capable of occurring in ordinary practice.

Let us in the first place show why it is highly improbable that the explosion could have occurred as stated above.

If the explosion had originated, as is suggested, in the meter house, it must have destroyed the meter itself, since its violence was so great that the shock produced by it was felt across the river in Pimlico. In the next place, the mere burning of the gas in No. 1 gasholder could not have blown out the roof, leaving the structure in the condition in which it was afterwards found, for it would have burnt quietly away at the orifices already made in the side of the gasholder. That this would be the actual effect is shown by the burning of the gas in holder No. 2.

We will now examine the theory that gasholders cannot explode, and see upon what it is based, and how far it may be modified by the practical conditions under which gas is generated and stored.

Hydrogen gas, and also carburetted hydrogen, is not capable of producing an explosion under any circumtances when pure, that is to say, when unmixed with any considerable amount of some other gas, such as oxygen, capable of readily combining with it. The difference between quiet combustion of the gas and its violent explosion may be thus stated:—In the former case, the combustible gas and that which supports its combustion are not mixed together, but merely come into contact at some particular point or points, and, on the application of fire at that junction, ignition ensues over the plane of contact, and proceeds quietly so as the supply of the two gases is continued. The resulting products will be carbonic acid gas and steam; of course, with ordinary coal gas, other products will also be generated, such as sulphurous acid gas, &c., in small quantities, but, for our present purpose, it is not necessary to take those into consideration. When two bodies of the gases have become thoroughly intermixed in about the combining proportions, if a light be then applied to them, instantaneous combination throughout the mass will take place, great heat being thus generated, causing an enormous temporary expansion of the resulting gaseous products, and producing an explosion of a very violent character.

If it be assumed that the gas in No. 1 holder was not mixed with atmospheric air, then the flames could not pass to its interior, and blow out the roof as was suggested, for there would be no oxygen to support combustion, except at the fracture, and, therefore, at that point only could ignition continue.

It is, however, certain from the effects produced that there was an explosion of gas, and that a very violent one, and, moreover, it must have occurred within the gasholder, for otherwise the crown plates would not have been blown outward. This at once upsets the cherished maxim that gasholders cannot by any possibility blow up, for, unfortunately for those who have been wont therewith to comfort such as reside near large gasworks, and perhaps themselves, this is not one of those cases where "the exception proves the rule."

It now remains to ascertain how air could have been introduced into gasholder No. 1, for it is clear that it must have been there, otherwise the calamity would not have occurred. In the retorts, gas is generated from coal by the action of external heat; this, after depositing by condensation its accompanying tar, ammoniacal liquor, &c., in the hydraulic main condenser, scrubbers and other contrivances passes into the gasholders, and, in those cases where it does so merely by its own pressure, of course no air can pass through along with it, for should a leak occur in the retort, or any of the communications between it and the holder, gas will escape therefrom by reason of its pressure. But in extensive works it is found that the amount of ressure necessary to force the gas through the various vessels between the retorts and its point of distribution from the works is so great as to be injurious, and, therefore, the retorts are relieved from that pressure by pumping out the gas from them into the holders by means of an "exhauster," and it is to this apparatus that we feel inclined to attribute these gas explosions when they do occur. If a leak should occur on the suction side of the exhauster, and the supply of gas should fall short, a quantity of air would be drawn in and forced into the gasholder, and, being thus intermixed with the gas, would give rise to the explosive compound to which we have referred, after which, ignition would only be required to produce such an accident as that which lately shook the neighborhoods of Vauxhall and Pimlico, and caused a disastrous sacrifice of life.

In conclusion, it appears to us that henceforth engineers must modify the axiom of the non-liability of gasholders to explosion, at least in those works where exhausters are in use.— *London Artizan.*

It seems as the result of the inquest lately held in London, over the causes of the terrible explosion at Nine Elms, that the explosion did not take place in the gasholder, but by the acidulated ignition of gas which had escaped from it. In consequence of the carelessness, or ignorance of some workmen engaged in making repairs, the regulator was misplaced, and a free vent given to the gas. Thus escaping gradually in large quantities, came in contact with light outside, and the terrific explosion was the result. EDITOR.

TAR has been highly recommended among the operators in Germany, as a combustible for the manufacture of gas. They are unanimously of opinion that it should be used where its cost is not proportionally too great, as its employment preserves the retorts from too rapid detereoration.

MODIFICATION OF THE LENOIR GAS ENGINE.

A very valuable improvement in the Lenoir gas engine has been effected by M. Hugon, of Paris. Hitherto the explosion of the mixture of coal gas and air employed in these engines has been effected by means of a volatic spark, but M. Hugon effects it by a contrivance which is at once somewhat cheaper and much more regular in its working. To the slide or other valves regulating the admission of gas and air into the cylinder he attatches little burners, supplied with gas under pressure, and he so arranges that the flame from these burners shall explode the mixture in the cylinder at the proper time. These little jets are blown out by the explosion, but are afterwards relighted by an outer jet, which is kept constantly burning. This simple improvement seems likely to considerably diminish the uncertainty and irregularity which have hitherto characterized the action of the gas engine.—*Scientific American.*

NEW SILVER SALT,

It is stated that M. Meynier, of Marseilles, is manufacturing a salt which he calls an ammoniacal nitrate of silver, or nitrate of silver and ammonia analogous to the ammoniacal sulphate of iron introduced by him or developing.

The advantages M. Meynier claims for his new salt are the following:—It is much more sensitive to light than nitrate of silver, and, therefore, the time of exposure with this salt is much shorter. The image obtained is sharper, and the sensitive plate can be kept in good condition for a longer time before exposure. Paper sensitized with this salt is also more sensitive, and its use does not necessitate so much care in the selection of a paper, as a paper which will not give passable pictures with the ordinary silver bath will yield good pictures with the new preparation. Another advantage claimed for this salt is that it dispenses with all necessity for ammoniacal fumigation of albumenized paper, giving results equal in all respects to those obtained on fumigated paper. It is used in the same proportions as nitrate of silver for forming the baths. For negatives on collodion or albumen, the bath should be slightly acidulated with glacial acetic acid, in the proportion of two or three drops of acid to four ounces of solution. The solution for paper pictures, on the contrary, should be rendered alkaline by adding thirty or forty minims of liquid ammonia to a quart of solution. The salt should always be dry and quite neutral before being used; if it be acid, a little more ammonia must be used in the bath for paper. Last, and not least, the price is such that a saving of thirty per cent. of the nitrate of silver now used is expected.

M. Niepce de St. Victor promises in his next memoire to describe a new mode of preparing a silver plate, by which he obtains not only the natural colors black and white, but the luster of metals and the sparkling of precious stones. The labors of this savant are extraordinary, and among all workers in our science none engaged in more delicate and refined researches, or in the pursuit of experiments for results so marvelous, as the eminent philosopher of the Louvre.—*Scientific American.*

On Sugar Creek, Pa., where the price of oil at the wells has averaged $30 per barrel, one barrel per day will pay for working the well and leave a profit to the owner.

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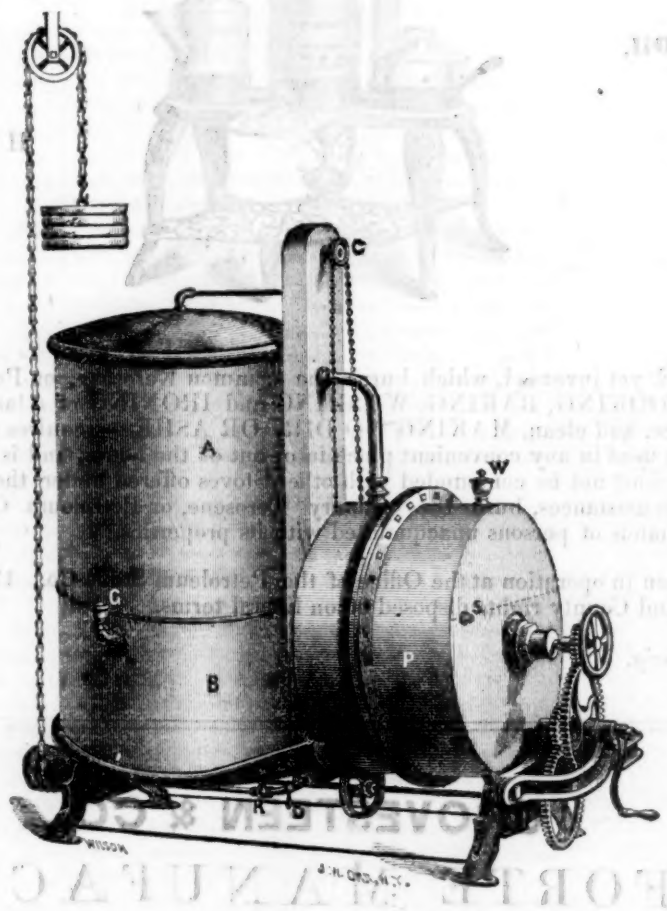
Is a mixture of the vapor of hydro carbon with common air. The mechanical devices employed are such as, from a long experience and critical examination into the nature of the element brought into use, seem best adapted to secure a certain and satisfactory result. GASOLINE, the liquid employed, is the most volatile portions of Petroleum, of a specific gravity of 0.6587. This liquid exposed to the action of this machine is vaporized, and a close mechanical mixture of the vapor with common air is effected. The value of the gas produced, its permanency, its illuminating quality, and freedom from liability to condensation, depend almost entirely upon the perfect and uniform character of this mixture. Hence the great importance of mechanical means adapted to secure all the conditions requisite in a Portable Gas Machine.



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For Wet Meters, Gasoline Machines, Hydraulic Presses, &c.

We warrant our Glycerine free from acid and not to corrode the Meter metal, or to congeal or freeze at a stated temperature—also, not to evaporate to any extent The advantages and savings derived from the use of our fluid can be testified by many Gas Light Companies which we have supplied. We only refer to the certificates of H. J. Miller, Esq., President of Cincinnati G. L. and Coke Co., and Dr. J. Lawrence Smith, Professor of Chemistry in the Louisville College, and President of the Louisville Gas Co.

HARTMAN & LAIST,

Office No. 71 Main street, Cincinnati.—Chemical Works on Providence st, and Miami Canal, near Findlay st.

CERTIFICATE.

Office Louisville Gas Co., Louisville, June 28, 1865.

This is to certify, that the Louisville Gas Co. have used for about two years, the Glycerine prepared by Messrs. Hartman & Laist of Cincinnati, in their Wet Meters, and have in all instances found it to give most perfect satisfaction. Prior to the use of the above Glycerin, we had employed that manufactured by other parties, and we consider H. & L.'s superior to any we used.

J. LAWRENCE SMITH, President.

Office Cincinnati Gas Light and Coke Co., July 7, 1865.

This will certify, that Messrs. Hartman & Laist of Cincinnati, furnished this Company with Glycerin for Wet Meters some two years since It has proved very satisfactory, having resisted the action of frost during two winters and evaporating not more than six per cent. per annum, as guaranteed by them. The standard being, for density, 15 deg. Beaume's scale. They were the first to introduce it practically to this Company. H. J. MILLER, President.

☞L. BRUCKMAN, 107 Warren street, up-stairs, Agent for New York.

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AND OTHER PURPOSES.

We solicit attention to Glycerin for filling Gas Meters in place of high wines, or any other substance — Our Glycerin is superior to anything ever used for the purpose, being entirely free from corrosive property, and made from the same material as the finest article for medicinal use. It will not evaporate, consequently there will be no further expence necessary in filling Meters. Glycerin of 15° Baume will stand a temperature of 14° below zero without congealing, and the more concentrated the greater degree of cold it will stand.

We have been engaged in Manufacturing Glycerin the past 8 years, and from our advantage in material and the large amount we make, are enabled to offer it lower than any manufacturer in this country. Finding the wide range that Glycerin would assume in Pharmacy, the Arts and for mechanical purposes, we have entered into the manufacture of articles adapted to the various uses and are now prepared to offer it adapted to every purpose for which it can be used at less than any article now in competition with it. We annex the following letter from S. S. Stratton, Esq., to show practically its advantages.

OFFICE OF THE COVINGTON GAS-LIGHT CO.
COVINGTON, KY., Feb. 18, 1864.

MESSRS. W. J. M. GORDON & CO.:

Dear Sirs,—It affords us great pleasure in testifying to the superiority of the Glycerin Fluid purchased from you for filling the Wet Meters now in use by the Covington Gas-Light Company.

The difficulty of finding a non-evaporating and anti-freezing mixture for Wet Meters, has, in my opinion, been overcome by the use of your Glycerin Fluid.

I have had it in constant use for the past four months, and during that period the thermometer has ranged as low as 14o below zero, and after careful examination, I have found the fluid in the same condition as when first put in the Meters, and without the slightest discoloration.

Its non-evaporating quality does away with the hitherto unavoidable expense of filling the Meters monthly, and renders Wet Meters no longer objectionable.

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S. S. STRATTON, *Sup't Cov. Gas Co.*

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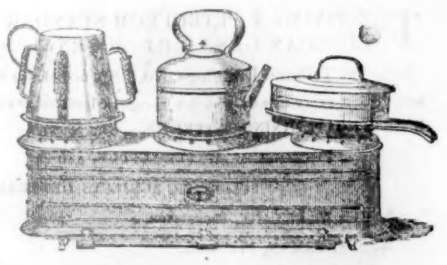

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Positively guaranteed free from Smoke or Smell.

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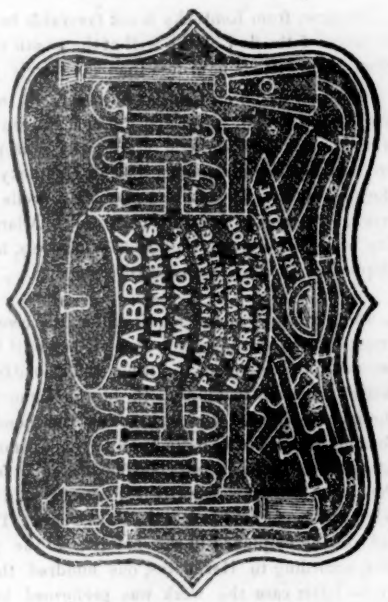

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The Mining and Petroleum Standard

AND

AMERICAN GAS-LIGHT JOURNAL,

PUBLISHED ON 2D AND 16TH OF EVERY MONTH.

JAMES W. BRYANT, DR. C. W. TORREY, } EDITORS.

TUESDAY, JAN. 2d, 1866.

☞ Our subscribers would confer a favor upon us by remitting *checks, or Post Office Money orders*, as we are frequent losers by money sent by mail.

☞ We should be pleased to make our journal an organ of intelligent discussion for those of our subscribers and readers who may wish to gain, or give information on the subjects to which our columns are devoted. We solicit letters from those who make the study of gas a pleasure as well as a profession.

The news from Kentucky is not favorable to the continuance of the flow of the well at the month of Crocus creek. Its yield is now less than 50 barrels per day.

Kentucky as an oil field is, however, by no means waning in interest, and Boyd's creek, Barren county, where borings began in May last, will now probably produce as much in one month as all Kentucky during the past year. There are 6 producing wells on this creek. No well is down over 250 feet. A large quantity of oil, reported as high as 3,000 barrels, has been shipped by the Boyd's Creek Oil Company.

The Great Pyramid required for its construction twenty years, and the labor expended upon it has been estimated as equivalent to lifting 15,733,000,000 cubic feet of stone one foot high. If, in the same manner, the labor expended in constructing the London and Birming am Railway be reduced to one common denomination, the result is 25,000,000,000 cubic feet more than was lifted for the Great Pyromid, and yet the work was performed in less than five years. The number of men employed in the building of the pyramid was, according to Herodotus, one hundred thousand; in the latter case the work was performed by about we thousand.

Professor Agassiz is said to be having "a great time" in Brazil, having discovered three hundred entirely new species of fish in the valley of the Amazon. His lectures are the fashion and are attended by the scientific and cultivated men, of whom Brazil boasts no inconsiderable number. They are of course delivered in French, which is the colloquial tongue of the educated Brazilians. A man of the lower clases attending his lectures, was enthusiastic in their praise. "But they are French," urged his comrades, "and you do not understand French." "Understand French!" repeated the other with sublime disdain, "it is unnecessary. To see the man is enough; his wonderful clearness and perspicuity are self-evident; his style is exhaustive; he takes a crayon and draws the figure of a fish; what more could one wish? the fish is accurate, perfect. French indeed! when one has eyes!"

As an addendum to this fish story, we may record the discovery recently made by a Swiss naturalists, M. Desor. He has found small fish in Algerian artesian wells, two hundred feet deep. They belong to the carp species, and have fine large and perfect eyes, thus differing from all hitherto discovered subterranean fish, which are blind.

We have reports of further discoveries of gold in the oil region of Greene county, Pa., and it is alleged that quertz veins have been struck at different points, and at various depths approaching the surface. Specimens have reached the Philadelphia mint, and the character of the auriferous rock established by assay. The quartz seam is apparently in a slate rock through which slate also the gold is disseminated. It is stated that at some wells the borings are to be widened in order to test further the character of the metalliferous rock. Geologists are skeptical about such veins, but as practical miners as well as practical oil men believe geologists point out nothing until it is found out by others, the opinions of the scientific men are held in utter contempt. Whether the wells have been "salted" or not, time will perhaps show. The gold would indicate displacements in the lower strata of the coal measures here, which geology has not anticipated. Mining experience is, however, constantly affording exceptions to the supposed laws of mineral deposition.—*American Exchange and Review.*

A SHIP OF THE SECOND CENTURY.

"Shipbuilders," said Mr. Donaldson, at the Institute, "are proud to call themselves naval architects," and here is something for them. In the course of digging a trench for military purposes, during the late Danish war, the workmen came upon boggy soil, and at a depth of 5 ft. discovered the remains of a very ancient ship embedded in the bog. The site is now some distance from the sea (at Wester-Satrup, in Sundewitt Bay); but at the time when it was deserted it was no doubt "run up" on the beach. Is is of oak, but in so very defective a condition, that it had to be strengthened with iron bands before it could be removed to Flensburg, where it may now be seen. The keel is bent upwards at both ends, after the fashion of a modern gondola, raising to a height of 9 ft. 10 in. in the bows, and 10 ft. 11 in. at the stern. The total length is 79 ft. 10 in. by a width of 11 ft. 10 in. in the waist, by a height of 4 ft. 2 in. There appears to have been no deck, but several lockers were found, some of which contained bones of animals. Besides this were discovered a number of spears, bows, arrows, battle axes, wooden clubs, knives, &c.; but, what was more important, some coins were found, which give the date of the time when this ship floated, not only on the Baltic, but perhaps to the distant shores of Britain. The coins are Roman, and of the second century, A.C.; and there were also bracelets, rings, and other ornaments, besides cooking utensils, &c. All these articles are now in the Archaeological Museum at Copenhagen, but the ship itself the Danes were unable to get away before they had to give place to the advancing Austrians.—*London Builder.*

PROPERTIES OF GREASE, &c.

In the "Book of Medicine" (called Materia Medica), we have written down the properties of each article; that is, the qualities the agent possesses—whether it will stimulate one or another part of the human body, if brought in contact with it. This is a scientific manner of doing business. But now, let us leave this "Book of Medicine," or "book of poisons," and take a slight glance at the "Book of Food" (called Dietics), and ascertain if the physicians and their friends and patrons have noted down the properties of that which men, women and children swallow under the name of Food. Food should have more consideration than poisons; and yet neither physician, sage nor sire, seem to deem it necessary to write down in black and white the properties of food.

We now mean to give the properties of "Grease," and particularly animal oils. A true physiology, as well as common sense, teaches us that in animal oils are found to exist the various secretions, excretions, waste matters, and more or less nutritious materials of the animal from which the grease is taken. Hence the properties of grease derived from animals, according to the species of animal it is taken from, are emphatically non-nutritions — excrementitious —billious — obstructants—adhesive, (sliming and glueing-up air cells, sweat chaunels and pores, whilst it adheres to the inner skins as it does to the outer)—non-digestive—putrifying—sallow and pimple generative—&c., &c.

Oil is only required by the human system to grow and recuperate hair and nails, and a very small quantity is only needed for this purpose. Moreover, the human body extracts and manufactures its own essential oils, out of the vegetables, fruits and grains that it receives into the healthy stomach. Proof: The horse, ox and elephant are vegetarians, which have hair, hoofs or nails, but have no dyspepsia, gout, or sallowness, wormb complaints, diptheria, scrofula, or other family diseases; and yet they have fat, hair, hoofs or nails, made by their own systems from vegetables. Old Grease pots will you plerse smoke these properties in your filthy pipes, and then say we are the "fanatics" and "quacks?" If you want to be stuffed and clogged full of scrofulous and tuberiulous matters, and look gross, like a purpoise and frying-pan, stick to grease, and melt it into pies, bread, and everything else. Hurrah for Grease!

We commend to all those interested, the following testimony in favor of Robbins' Improved Gas and Water Joint, and have only to say that we have the very highest authority in pronouncing it the best joint now in use. We recommend it to the consideration of Gas Companies, and invite attention to their illustration in our advertising columns.

OFFICE OF THE PENNSYLVANIA TUBING TRANSPORTATION COMPANY,
Oleapolis, Pa., Dec. 18, 1865.

R. C. ROBBINS, Esq.,

Dear Sir:—It gives us great pleasure to inform you that our 6 inch line of pipe from the wells at Pit Hole, to the Aleghany river, a distance of 7 miles, is now in operation, and is in all respects a perfect success. Your joint in particular gives us great satisfaction, there has not been a solitary leak or a tool required to be used on one of the joints for the whole 7 miles. Considering that our line crosses the creek fifteen times, and much of the pipe was laid under water, and in the depth of winter the result is certainly very satisfactory, the line has been in operation ten days, and we find that all the oil put into the pipe safely reaches our reservoir.

I beg to congratulate you on this further proof of the superiority of your joints, and the great utility of your improvement.

Yours truly, DAVID KIRK,
Superintendent Penn., Transportation Co.

The Mecca oil district, Trumbull co., Ohio, is exhibiting a new feature in oil production, which is akin to regular mining in the general sense of the term, viz., the use of shafts with the prospect of works for the extraction of the oil from the rock. It appears that in the vicenity of Mecca, at various depths from 60 feet to near the surface, say 12 feet from the top, there exists, not a bituminous shale, but a yellowish brown sandstone impregnated with petroleum of a heavy

gravity, affording from 20 to 40 gallons of oil per ton. Some 6x10 shafts are now into the rock. At first the attempt was made to extract the oil by means of steam or heated water, but through this procass small quartz crystals were drawn off with the oil and into it. It is stated that this defect is remedied by a new system which is cheap and effectual, and by which 15 tons of rock per day can be readily treated.

It is now recomended that vessels of war should be built of magnesium, which is but little heavier than heart of oak, and as strong and tenacious as steel. It is estimated that the ocean itself contains 160,000 cubic miles of magnesium, a quantity which would cover the entire surface of the globe, both sea and land, to a thickness of more than eight feet. In obtaining salt from sea-water, the residuum is largely magnesium. The burning of a magnesium ship at sea would be a magnificent sight, a fire at which the stars "cold in their unimagined distances" might warm themselves.

It is stated that a project is on foot to photograph the catacombs of Rome by the aid of the magnesium light, a project which it is expected the Papal Government will aid.

H. A. Bonneville, of London, proposes a patented plan for simplying the manner in which bars or rods of iron are produced at present. The apparatus consists of a series of cylinders or rollers, in and around each of which are cut groves or flutes, having one or other, or half of one or other of the forms generally given to iron rods, viz., round, half round, square, octagonal and hexagonal, and this apparatus permits the use of iron slit by any of the known systems. The iron for any of the above forms should undergo two operations. The lump on leaving the reheating furnace should be worked in so as to be able to pass the slitter. As soon as this operation has taken place, the first part of the work is done.

The literature of India is about to be enriched by the addition of "Hamlet," which is being translated by Nena Sahib, eternally infamous as the butcher in the great Indian Rebellion. So at least the ancient drama of "Sakuntala" or "the Ring" will have a formidable rival in one of greatest plays ever producod by modern genius. It is hard to conceive that a man can exhibit an equal refinement in cruelty and in liturary pursuits, can wield both the sword before which the innocent and helpless fall, and the pen, which transcribes the noblest sentiments, the most profound tenderness of which the heart is capable. "Versatility" indeed, like that of the hero in Praied.

Who slipped from politics to puns,
Who skipped from Mahommed to Moses.

Of the 46 wells of Pit Hole lately recognized as productive, 8 have ceased to flow, and 10 are out of order. Both the United States and well No. 77 Holmden farm, "Dr. Deshler well," stopped October 11th. The latter was struck last August and yielded two months, and attained as high as 150 barrels per day. For nine months the United States averaged daily 500 barrels. It is stated that the cause of the failure of the United States was flooding through of the new wells going down in the vicinity. It seems that the most productive of Pit Hole territory has now as many wells upon it as can be successfully worked. New wells are deemed detrimental to old ones. With a new and powerful engine, pumping out the water, it is possible that the flow of the United States may be partially restored.

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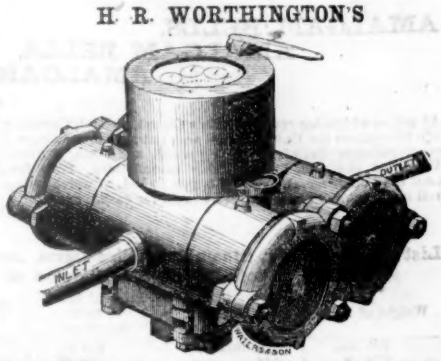

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375	34	94 00	22 00	116 00
450	44	112 00	25 00	137 00
600	02	150 00	30 00	180 00
750	39	188 00	35 00	225 00
1,000	64	250 00	42 00	292 00
1,200	48	300 00	45 00	345 00
1,400	50	350 00	50 00	400 00
1,600	52	400 00	54 00	454 00
1,800	55	450 00	60 00	510 00
2,000	58	500 00	62 00	562 00
2,500	60	625 00	72 00	697 00
3,000	63	750 00	85 00	835 00
3,500	66	875 00	87 00	962 00
4,000	69	1,000 00	100 00	1,100 00
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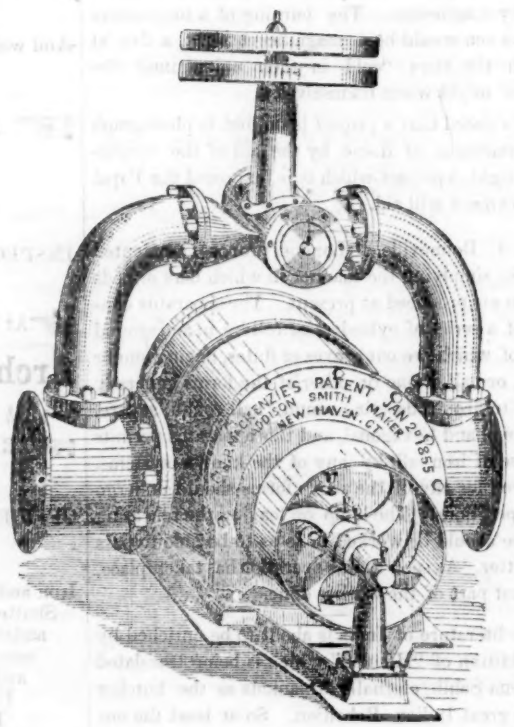

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This Machine is constructed on entirely new principles of mechanism, possessing many rare and valuable improvements, having been examined by the most profound experts, and pronounced to be SIMPLICITY and PERFECTION COMBINED.

It has a straight needle, perpendicular action, makes the LOCK or SHUTTLE STITCH, which will NEITHER RIP nor RAVEL, and is alike on both sides; performs perfect sewing on every description of material, from Leather o the finest Nansook Muslin, with cotton, linen, or silk thread, from the coarsest to the finest numbert.

Having neither CAM nor COG WHEEL, and the least possible friction, it runs as smooth as glass, and is

Emphatically a Noiseless Machine!

PRICE OF MACHINES,
COMPLETE:

No. 1, Family Machine, with Hemmer, Feller, Gauge, Braider, & Corder, complete. - - - $60
No. 2. Small Manufacturing, with Extension Table, $75
No. 3. Large Manufacturing, with Extension Table, $85
No 3. Large Manufacturing, for Leather, with Rolling Foot and Oil Cup, 100

One-half hour's instructions is sufficient to enable any person to work this Machine to their entire satisfaction.

Agents Wanted in all Towns in the United States, where Agents are not already established. Also, for Cuba, Mexico, Central and South America, to whom a liberal discount will be given Terms, invariably CASH on delivery.

T. J. McARTHUR & CO.,
536 Broadway.

WILCOX & GIBBS SEWING MACHINE

It is entirely noiseless.
A patented device prevents it being turned backward.
The needle cannot be set wrong.
It received the Gold Medal of the American stitute in 1863.
InSend for a circular containing full information, notices from the press, testimonials from those using the machine, &c.

JAMES WILLCOX,
Manufacturer, 508 Broadway, New York

Principal Offices:
NEW YORK—508 Broadway.
BOSTON—323 Washington street.
PHILADELPHIA—720 Chestnut street.
CHICAGO—133 Lake street.
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LONDON—135 Regent street.
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BRUSSELS—12 Rue Croisade.
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GAS-BURNERS.

T. G. ARNOLD,
MANUFACTURER OF
GAS-BURNERS
And Importer of SCOTCH TIPS,
224 and 226 West 21st street,
formerly No. 447 BROOME ST., New York.
Mercury Cups, Portable Sockets, Burner Pillars, Burner Pliers, &c., &c.

C. GEFRORER,
Manufacturer of
GAS-BURNERS,
For Lighting and Heating Purposes.
GAS HEATING AND COOKING APPARATUS; FITTERS' ROVING APPARATUS, &c.
529 Commerce st., bet. Market & Arch, Philadelphia.

WOODEN PURIFYING TRAYS
PATENT
Conically Slotted Solid Wood Sieves
FOR PURIFIERS.

The Conically Slotted Solid Wood Tray or sieve was patented 21st October, 1862, and all persons are cautioned against purchasing them of any other person except the subscriber. The following companies are now using these trays.

Manhattan, New York,
Metropolitan,
New York
Albany,
Troy
Brooklyn, L.
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Citizens
Baltimore Md.
Louisville, Ky.
Chicago. Ill
Cambridge,
And numerous others

Orders received by mail or otherwise.
JOHN L CHEESMAN.
147 Avenue C New York City

WEST'S IMPROVED PUMPS, the most Simple, Durable, and Powerful, and the Cheapest in use.
J. D. WEST & CO.,
No. 40 Cortland street,

JOSEPH LENNIG,
1615, 1617, and 1619 Francis St.,
Above Ridge Avenue, Philadelphia, Pa.,
MANUFACTURER OF
WET & DRY GAS METERS,
STATION, SHOW, & EXPERIMENTAL METERS,
Photometers, Pressure Registers, Indicators, and Gauges, Governors. Meter Provers, Centre Seals, Fluid Gauges, &c.
GAS APPARATUS
Of the most reliable and approved construction manufactured and on hand at the
UNION GAS METER WORKS.

D. PARRISH, Jr.,
GAS ENGINEER
And Contractor for Coal or Oil Gas Works.
Estimates given for Gas-Works, Gas-Holders, or any Gas Apparatus,
205 1-2 Walnut st., Philadelphia, Pa.
Box 1956, Post Office.

To Manufacturers of Petroleum Gas.

For sale, Parrish's Patent Gas and Air Mixer, adapted to all works using Petroleum or other oils, by which rich Petroleum Gas is mixed, after it leaves the holder, with a proper proportion of air, giving it the greatest illuminating power, without smoke, through any burners. The apparatus being attached to the outlet pipe, requires no alteration of the works.

Apply at the Gas-Works of St. Nicholas Hotel, No. 63 Mercer st., N. Y., where one can be seen in operation; or address D. Parrish, Jr., St. Nicholas Hotel, New York city, or No. 1416 Arch street, Philadelphia.

TO GAS COMPANIES.

THE UNDERSIGNED DESIRES TO undertake the supervision of several small Gas-works, to visit, and examine them as often as may be necessary; to obtain and inspect their coal, castings, fire-brick, and other materials; and to manage their general business in such a manner that they shall be under such supervision as is now attainable in large works, at much increased cost. Also, to advise as general Consulting Engineer and expert in practical chemistry.

CHAS. M. CRESSON,
Late Asst. Engineer of the Philadelphia Gas-works
417 Walnut st., Philadelphia.

THE AUBIN
GAS-WORKS COMPANY,
Of Albany, N. Y.,

Now contract their works to make 10,000 feet of good Gas from 2,000 pounds of *hard* wood and 40 gallons of kerosene tar, *before payment can be demanded;* and the charcoal is worth the cost of the wood.

Many Village Gas Companies can be referred to.

R. D. WOOD & CO.,
MANUFACTURERS OF
CAST-IRON PIPE, RETORTS, &c
Office, 400 Chestnut street,
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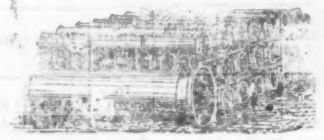

Carrington & Co.'s
GENERAL
PURCHASING
AGENCY,
In Connection with all the Expresses,
No. 30 Broadway,
NEW YORK.

Established 1854.

Purchases to order ANY article wanted from New York, (or from Europe,) for ladies' or gentlemen's use or wear,—comfort or luxury—from a cameo to a cashmere—a sea ring to a steam-engine.

Goods purchased at current City prices, and forwarded by Express, or as directed.

Commission, Five Per Cent.

Remittances, with orders, can be made by Express if preferred, as all Express Agents will take orders, receipt for and forward funds, and see to return of Goods.

SPECIAL CIRCULAR.

The Adams Express Company, appreciating the need of a capable medium connecting with the various Express Lines, through which personal and other orders for goods from this city, can be satisfactorily supplied, do recognize CARRINGTON & CO.'S GENERAL PURCHASING AGENCY as such a medium for filling orders for every description of goods wanted from New York, and commend it to the attention of the public, and of our general and local agents, recommending our agents to extend to it all reasonable aid, by facilitating the distribution of its cards and circulars, and making known the advantages it affords.

ADAMS EXPRESS CO.
By W. B. DINSMORE, Prest.
NEW YORK, June, 1864.

We cheerfully concur in the above recommendation of the Adams Express Company.
AMERICAN EXPRESS COMPANY,
By HENRY WELLS, Prest.
UNITED STATES EXPRESS COMPANY,
By D. N. BARNEY, Prest.
WELLS, FARGO & CO.,
NATIONAL EXPRESS COMPANY,
By J. A. ULLEN
HARNDEN EXPRESS,
By L. W. WINCHESTER, Supt.
KINSLEY & CO.'S EXPRESS,
By E. LITTLEFIELD, Supt.
HOPE EXPRESS COMPANY,
A. D. HOPE, Supt.
BREESE & CO.'S EXPRESS,
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NEW JERSEY EXPRESS COMPANY,
By GEORGE R. DUNN, Sup

The Greatest Improvement yet in the Sewing Machine Art!

A CURIOSITY WORTH SEEING!

Please send for circular with sample of sewing.

These Improved Machines save ONE HUNDRED PER CENT. of thread and silk, and make the LOCK-STITCH alike on both sides.

They require no instruction to operate perfectly, except "the printed directions."

No change in sewing from one kind of goods to another.

And no taking apart to clean or oil.

Our NEW MANUFACTORY is now complete, with all its machinery and tools entirely new, and is already rapidly turning out Machines which for BEAUTY and PERFECTION of FINISH are not surpassed by any manufacture in the world.

N. B.—Should any Machine prove unsatisfactory, it can be returned and money refunded.

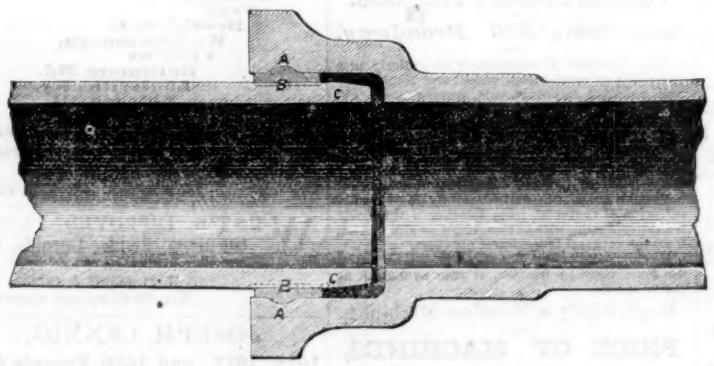
Agents wanted in counties not vassed by ur own agents.

Finkle & Lyon S. M. Co.
No. 533 BROADWAY, NEW YORK

SECTIONAL VIEW OF

ROBBINS' PATENT GAS AND WATER JOINT.

AND FOR OTHER PIPES.



A A—Lead Joint, after being pressed; the dotted lines B B show the inside diameter of the Lead Ring before being pressed.

This Joint is made by pressing the spiggot end of the Pipe C into the socket end of the other Pipe, the spiggot end being slightly tapering, compresses the Lead Ring from its first shape, as shown by the inside dotted lines, to the form shown by the dark shading.

For further information, or for prices and terms, which will be very reasonable, apply to

R. C. ROBBINS & CO., No. 218 FULTON STREET, ROOM No. 2, NEW YORK.

LILLIE'S
CELEBRATED
Chilled and Wrought Iron Safes,
WROUGHT IRON FIRE-PROOFS,
LOCKS AND VAULT DOORS.

These Fire-Proofs are manufactured to supply a demand for Security Against Fire, less expensive than my celebrated and superior Chilled and Wrought Iron Burglar and Fire-Proof Safes.

They furnish similar and equal security to the Safes generally manufactured in the different cities, but are SUPERIOR to them in their Fire-Proof qualities and durability, the iron being effectually rotected from rust in any climate, and the Fire-proof not subject to lose its utility by age ' This is an important advantage gained to the purchaser, as Safes often rust out and become worthless in wo or three years.

To substantiate my position, those purchasing these Fire-Proofs are at liberty, by giving me due notice of time and place of trial, to test them by fire with any other Safe of the same size; and should they not prove superior, I will refund the money, or a new Fire-Proof, as the purchaser may decide.

LIST OF SIZES & PRICES OF WROUGHT IRON FIRE-PROOFS

	Outside.			Inside.			
No.	Height.	Width.	Depth.	Height.	Width.	Depth.	Price.
6	40	31	27	31	21	15	$150
5	34	21	26	24	21	14	125
4	31	27	25	22	18	13	110
3	30	24	24	21	15	12	100
2	28	22	23	20	14	12	75
1	24	19	20	17	11	10	50

Sample of Fire-Proof Safe at Office of the Am. Ad. Agency, 389 Broadway, N. Y.

PRICE LIST.
LILLIE'S CELEBRATED CHILLED & WROUGHT IRON SAFES.

BANK, FIRE, AND BURGLAR SAFES.
Folding Doors, D Lock.

OUTSIDE.				INSIDE.			
No.	Height.	Width.	Depth.	Height.	Width.	Depth.	Price.
	In.	In.	In.	In.	In.	In.	
1	66	50	29	54¼	39	18	$950
1½	59	50	26	48	39	15	800
2	53	44	27	42¼	33	15	600

MERCANTILE F AND B SAFES.
Folding Doors and Monitor Locks.

3	50	42	27	40	32	16	$500
4	46	42	27	36	32	16	450
4½	38	46	27	28	36	16	450
5	42	38	27	31¼	27½	15	350

Single Doors and M. Lock.

6	38	35	26	27⅛	23½	15	$250
7	34	31	26	24	21	14	200
8	31	28	24	21	18	13	175
9	30	24	24	21	15	12	140
10	26	22	22	19¼	13½	12	120
11	24	20	18	17	17	10	100

HOUSE SAFES.

SIDE BOARD	$600
DINING ROOM	350
PANTRY (No. 1)	275
PANTRY (No. 2)	150
DUODECAGON BANK LOCK	100
MONITOR SAFE do.	50
SAFE do.	10

NATIONAL BANK SAFES,
With 2 Inside Burglars and 1 D and 2 M Locks.

OUTSIDE.				INSIDE.			
No.	Height.			Hei	Width.	Depth.	Price.
	In.			In.	In.	In.	
1	68			55	39	18	$1,200
2	61			48	39	18	1,050
3	57			42½	33	18	900

BANK VAULT BURGLAR SAFES,
With Folding Doors and D Lock.

0	68	53	27	64	48	20	$1,000
0½	61	53	27	55	46	20	800
1	57	47	27	49	40	20	600

BANK VAULT BURGLAR SAFES,
Single Doors and D Lock.

2	53	32	26	49	28	
	42	36	22	38	32	19
4	36	31	20	32	27	
5	30	24	18	26	20	14

BANK VAULT DOORS AND FRAMES,
D and S Lock.

No.	Height clear.	Width clear.	Depth adjustable.	Price.	Weight.
	In.	In.	In.		
1	72	27	20	$400	3,000
2	72	27	20	275	1,500

Orders received and filed at net cash prices, by the AME[RICAN ADVERTISING AGEN]CY, 389 Broadway, New York. All Safes shipped from Troy free of cartage.
....sfess Depa-t., E. ALVORD. *Corresponding* OWLER

WEST'S IMPROVED PUMP.
Anti-Freezing, Double-Acting, Forcing, and Lifting

These Pumps have now been in general use a number of years, and give better satisfaction than any other, and are recommended as

THE BEST!

by CAPTAIN ERICSSON and other eminent engineers. We can refer to thousands using them, a guarantee that all will recommend them. They are more simple in construction, and work easie and cost less than all others.

"Our readers will find the double acting, improved pump of J. D. West & Co., one of the best the market. It is very simple, works to a charm, so that any child may use it; throws a stead continuo us stream, and does not freeze in the coldest exposures, and is unusually cheap. We sa this know.ngly, and give the testimony of our own accord, without the knowledge or request of the proprietor "—*New York Evening Post, July 1st*, 1863.

"J. D. WEST & Co.: We are pleased to state that the Pumps we had of you about a year ago, have been in constant use, twelve hours each day, and raise for the use of our woolen factory, about 130 gallons per minute. They work with but little power, compared with pumps we have used before, and do not get out of repair, and are satisfactory in all respects.

"DUNLAP MANUFACTURING CO."

Solon Robinson to the Farmers' Club.

Jan. 23.

"No farmer who owns a well or cistern can possibly afford to be without an iron pump. It should be a once a suction and force pump—a perfect little fire engine—such a one known as 'West's Improved Pump.' I speak of this Pump because I happen to know it....to be very simple, durable, powerful and cheap, and it don't freeze up, nor get out of order once a year....I know this, and think I may be doing the farmers good by speaking of it.....A boy ten years old can work it, and throw a continuous inch-and-a-quarter stream....It can be made to work in deep wells as well as ni shallow ones."

"The undersigned having to use "West's Improved Pumps," cheerfully recommend them as simple, durable, and powerful in raising and throwing water, and for their ease of action, security against frost, and low price, we believe them superior to all others.

"WARREN LELAND, Met. Hotel, N. Y.
"J. W. POMEROY, Yonkers, N. Y.
"JOHN MESSEREAU, N. Y.
"DOMINICK LAWRENCE, Westchester."

From the New York Observer.

"We have had in use for months past one of West's Pumps, which has given us more satisfaction as a force and lifting pump than any we have ever used. It is one of great power, and well adapted for ship's decks, mines, factories, greenhouses, graperies, etc. *The Mining Chronicle and Railway Journal* says: 'It is recommended for its extreme simplicity of construction, great strength, and consequent durability and cheapness of repair. There is no stuffing-box—the pressure being held by a cup packing, like that upon the working-piston, working in a cylinder, fitted for the purpose within the upper air chamber—which we think a great improvement, as stuffing is so liable to be deranged and leak under strong pressure, to say nothing of the loss by friction incident thereto. It has also two air-chambers; thus the action of the valve is cushioned upon both sides by air—preventing water-hammer and vacuum-thump. The valves are very accessible and simply and cheaply repaired. They work much easier than any pump we have ever seen; the 4-inch cylinder being worked by children in wells 100 feet deep, and as they are extremely cheap, as well an simple and strong, we freely recommend them.'"

"CAMBRIDGE MINE, N. C., June 15, 1863.

"J. D. WEST & Co.—Gents: The Pump which I ordered for our mine is received, and put to work in our underlay shaft, which we are sinking. We find that one man will, with ease, lift 50 gallons per minute. We lifted in three and a half hours all the water in the shaft, which measures seven by twelve feet and thirty feet deep, and it was full when we commenced. It answers our expectations in every respect, and our workmen are highly pleased with it. It will do great service with but trifling expense for repairs.

"Yours, respectfully, BURR HIGGINS."

"This may certify, that I have been using, at my manufactory, for the last four years, 'West's Improved Pumps.' I now have in use three of said Pumps, one of which is kept constantly at work, 24 hours of each day (save Sunda , and has been running for the past two years. I pronounce them, unhesitatingly, the best Pumps that have been brought to my notice, having used many others previously. They are simple in their construction, and not easily disarranged.

"N. Y., Oct. 10, 1859. JAS. A. WEBB."

We have plenty more such certificates, but think these are enough. For Pumps, Hose, Pipe, etc., address or call upon

J. D. WEST & CO., 40 Cortlandt st., New York.

Orders may be sent through the AMERICAN ADVERTISING AGENCY, 389 Broadway

EDDY'S

Kerosene Cooking & Heating

STOVES AND RANGES.

THESE COOKING STOVES WILL

☞ *Bake, Boil, Stew, Fry and Roast,*

With the greatest economy and facility, and without heating the room in which they are used. They are perfectly simple, operating like an ordinary Kerosene Lamp with a chimney, and are the only Kerosene Stoves that burn without smoke or odor.

"We have been perfectly astonished to see what a labor-saving, dirt saving and heat-saving institution is EDDY'S PATENT KEROSENE STOVE. Taking the cost of running it, and the result attained, it is the best patent in the market."—*Worcester Daily Spy.*

Our Heating and Cooking Stoves are very convenient and economical, especially where a fire is required but a few hours at a time.

Orders for Stoves may be sent through American Advertising Agency, 389 Broadway, New York.

LESLEY & ELLIOT,

Manufacturers, No. 494 Broadway, New York.

Send for Illustrated Circular. (136

KNITTING MACHINES

FOR

Families and Manufacturers,

☞ *Something New and Invaluable for Family Use.*

We offer the public the simplest, strongest and best Knitting Machine in the world.

It occupies but little space—is portable and can be attached to a stand or table, weighs about 40 lbs.

It will knit a variety of Stitches—the breakage of needles is trifling—the cost of needles is insignificant and the most delicate material can be knit pure and spotless, as the needles are not oiled.

Orders for Machines may be sent through the American Advertising Agency, 389 Broadway, N. Y.

Send for a Circular—Agents wanted.

DALTON KNITTING MACHINE CO.,

137] 537 Broadway, N. Y.

WEED'S

HIGHEST PREMIUM

Shuttle Sewing Machine

Has only to be seen and operated to be Appreciated.

Call and see for yourself before purchasing. Please bring samples of various kinds of thread, (such as is usually found at stores,) and various kinds of fabric, which you know the former most popular Sewing Machines either cannot work at all, or, at best very imperfectly.

SUPERIORITY.

over any other Machine in the market will be seen at a glance.

1st It runs easily and rapidly, and is so constructed as to endure all kinds of hard usage.

2d. No breaking of threads in going over seams.

3d. No imperfect action of the feed at uneven places in the work.

4th. The Weed-stitch catches of itself, and will sew from the finest lace to the heaviest leather, and 200 cotton to coarse linen thread.

5th. The Weed Machine will do beautiful quilting on the bare wadding, without using inner lining; thus leaving it soft as if done by hand.

6th. The variety of fancy work that can be done on the

WEED MACHINE,

with so little trouble, makes it equal, if not superior, to six machines combined; for instance, it Binds, Hems, Tucks and Sews on the band at the same time, and in face, the

WEED NO. 2 MACHINE,

as before stated, is equivalent to a combination of any six ordinary machines.

Orders for Machines may be sent through the American Advertising Agency, 389 Broadway, N. Y.

Below we give a few prices:

No. 2. Oil Black Walnut, Ornamented with Hemmer.	$60,00
No. 2. Oil Black Walnut, Half Case, Ornamented, with Hemmer.	65,00
No. 3. Extra Oil-Polished Black Walnut, Half Case, Large Table beautifully Ornamented.	75,00

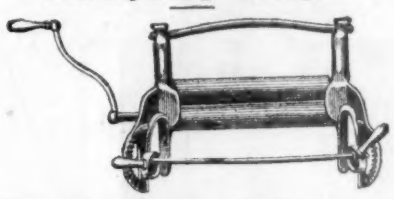
WEED SEWING MACAINE Co.,

'36) 506 Broadway, New York

PUTNAM'S CLOTHES WRINGER.

IT IS THE ONLY RELIABLE

Self-Adjusting Wringer.



No Wood-work to Swell or Split. No Thumbscrews to get out of order. Warranted with or without Cog-wheels.

It took the First Premium at Fifty-seven State and County Fairs in 1863, and nearly double that number in 1864, and is, without an exception, the *best* Wringer ever made. Patented in the United States, England, Canada, and Australia. Agents wanted in every town, and in all parts of the world. Energetic agents can make from $3 to $10 per day.

WHAT EVERYBODY KNOWS, VIZ.:

That Iron well galvanized *will not rust.*
That a *simple* machine is better than a complicated one.
That a Wringer should be *self-adjusting, durable, and efficient.*
That thumb-screws and fastenings cause *delay* and *trouble* to regulate and keep in order.
That wood soaked in water will *swell, shrink,* and *split.*
That wood-bearings for the shaft to run in *will wear out.*
That the Putnam Wringer, with or without cog wheels, will *not tear the clothes.*
That cog-wheel regulators are not essential.
That the Putnam Wringer has *all* the advantages, and *not one* of the disadvantages above named.
That all who have tried it pronounce it the *best* Wringer ever made.
That it will wring a thread or a bed-quilt *without alteration.*

We might fill the paper with testimonials, but insert only a few to convince the skeptical, if such there be; and we say to all, *test* Putnam's Wringer. Test it *thoroughly* with *any* and any others, and if not entirely satisfactory, return it;

PUTNAM MANUFACTURING CO.—*Gentlemen:* I know from practical experience that Iron well galvanized with zinc will not oxydize or rust one particle. The Putnam Wringer is as near perfect as possible, and I can cheerfully recommend it to be the best in use. Respectfully yours,

JOHN W. WHEELER, Cleveland, O.

Many years' experience in the galvanizing business enables me to indorse the above statement in *all particulars.*

JOHN C. LEFFERTS, No. 100 Beekman St.

NEW YORK, *January*, 1864.—We have tested Putnam's Clothes Wringer by practical working, and know that it will do. It is cheap; it is simple; it requires no room, whether at work or at rest; a child can operate it; it does its duty thoroughly; it saves time, and it saves wear and tear. We earnestly advise all who have *much* washing to do, with all intelligent persons who have *any*, to buy this Wringer. It will pay for itself in a year at most. HORACE GREELEY.

PRICES—$8, $9, and $10.
Sample Wringers sent, express paid, on receipt of price.
Manufactured and sold, wholesale and retail, by

PUTNAM MANUF'G CO.,
13 PLATT STREET, New York,
BENNINGTON, Vt.,
CLEVELAND O.

WATER AND GAS PIPE.

The Boston Bituminized Pipe Company,

Are now manufacturing and prepared to take orders, for their PATENT PIPE, (from 2 to 12 inches in diameter,) as a substitute for Iron, Copper, Lead, &c., for the conveyance of WATER, GAS, SEWERAGE, &c. &c.

From the testimonials received, and the entire satisfaction it has given those having it in use, we feel warranted in claiming for this pipe over that of any other, the following advantages, viz.:

It is much CHEAPER—has great strength (it having been tested to 500 lbs. to the square inch,) combined with LIGHTNESS, costing less for transportation; the joints are easily made and perfectly tight; it does not expand or contract from different degrees of temperature, and is free from *CORROSION* or *CONCRETIONS* forming; does not impart any taste or injurious properties to water, and as far as anything can be said to be indestructible, we deem this to be.

As a GAS PIPE, we say it has no superior. The Lowell Gas Light Co., purchased and laid some of this Pipe last year, and have likewise subjected samples to a test of four month's duration in their dry lime purifiers, with the most satisfactory results, in fact establishing beyond a doubt, its perfect adaptation to the wants and requirements of Gas Companies, specimens of which, together with the statement of O. E. Cushing, Esq., Agent Lowell Gas Light Co., who made these experiments, I shall be pleased to show, and give all other needed information, by applying in person, or by letter, to JOHN L. WEBSTER, Treas.,

Boston Bituminized Pipe Co.,
127] No. 2 Pearl st. House, Boston.

AMBROSE SPENCER GILCHRIST.

(LATE CAPT. U. S. V.,)

CIVIL, MINING

AND ARCHITECTURAL ENGINEER,

No. 200 BROADWAY, Office 12.

New York.

H. P. GENGEMBRE'S

PATENT

Non Freezing and Non Evaporating

METER FLUID,

☞ Far cheaper than any other in use. ☜

For Filling Wet Gas-Meters, cheaper, in the long run, than water.

Seven years of success!

Six years in general use in works using it, to the exclusion of all other fluid, and driving the dry meter out of use, enables us to recommend the patent with perfect confidence.

For information and purchase of rights, apply to

A. DOISEY, Esq., Sole Agent,

Box 2,180, Cincinnati, Ohio, or to

H. P. GENGEMBRE, Pittsburgh, Pa.

The privilege of using the Patent has been granted in the following cities.

Allegheny City, Pa.; Leavenworth, Kansas; St. Louis, Mo.; Chillicothe, O.; New York, N. Y.; Washington, Pa.; Greenbush, N. Y.; Ottawa, N. Y.; Detroit, Mich.; Hannibal, Mich.; Linn, Mass.; Lansinburg, N. Y.; Rock Island, Ill.; Burlington, Iowa; Mount Vernon, O.; Troy, N. Y.; Galena, Ill. Pittsburgh, Pa.; Ithica, N. Y.; Akron, O.; New Castle, Pa.; Portsmouth, O.; Brooklyn, N. Y.: Mansfield, O.; Steubenville, O.; Fort Wayne, Ind.; Peoria, Ill.; Wooster, O.; Bellefonte, Pa.; Kalamazoo, Mich.; Seneca Falls, N. Y.; Birmingham, Pa.; Saratoga Springs, N. Y.; Salem, O.; Dubuque, Iowa; Newark, O.; Wheeling, Va.; Jersey City, N.J. Quincy, Ill.; Piqua, O.; and others. [141

* * * * * *

New York, April 18th, 1864.

We respectfully invite your attention to and consideration of the justly celebrated and reliable remedy for DYSPEPSIA, HEARTBURN, DEBILITY and PROSTRATION. The Proprietors are proud to acknowledge the unparalleled success which has attended the sale of their valuable preparation, known in nearly every portion of the civilized world as the

"GOLDEN BITTERS."

We risk nothing when we term them a *valuable preparation*, for they are one of the few articles of the present day which are not a humbug; and we are willing and able to satisfy any person or persons who will call upon us, that the celebrated "GOLDEN BITTERS" are a genuine *bona-fide hygienic* article. It is the wish of the proprietors that the virtue of the article be tested before condemning. A decision of their merits by any one who has tried them, is worth a million of purchased bogus testimonials.

For Creating a Healthy Appetite

they are invaluable, and are unequalled as a TONIC. They are mild in their action, and operate by giving *vigor* and *strength* to the system,—not by any change they produce in the solids, but through the medium of the living principle.

They are Purely Vegetable,

being composed of Gentian Root, Calamus, Sassafras, and many other remedial agents of the Vegetable world, all preserved in Jamaica Rum and Sherry Wine.

As a Beverage,

They are the most *wholesome, invigorating* and *palatable* stimulant ever offered to the public. And the fact of their being prepared chemically and scientifically, precludes the possibility of a bitter, unpleasant taste, common to Bitters generally offered for sale. We especially recommend them to LADIES, and particularly to those suffering from

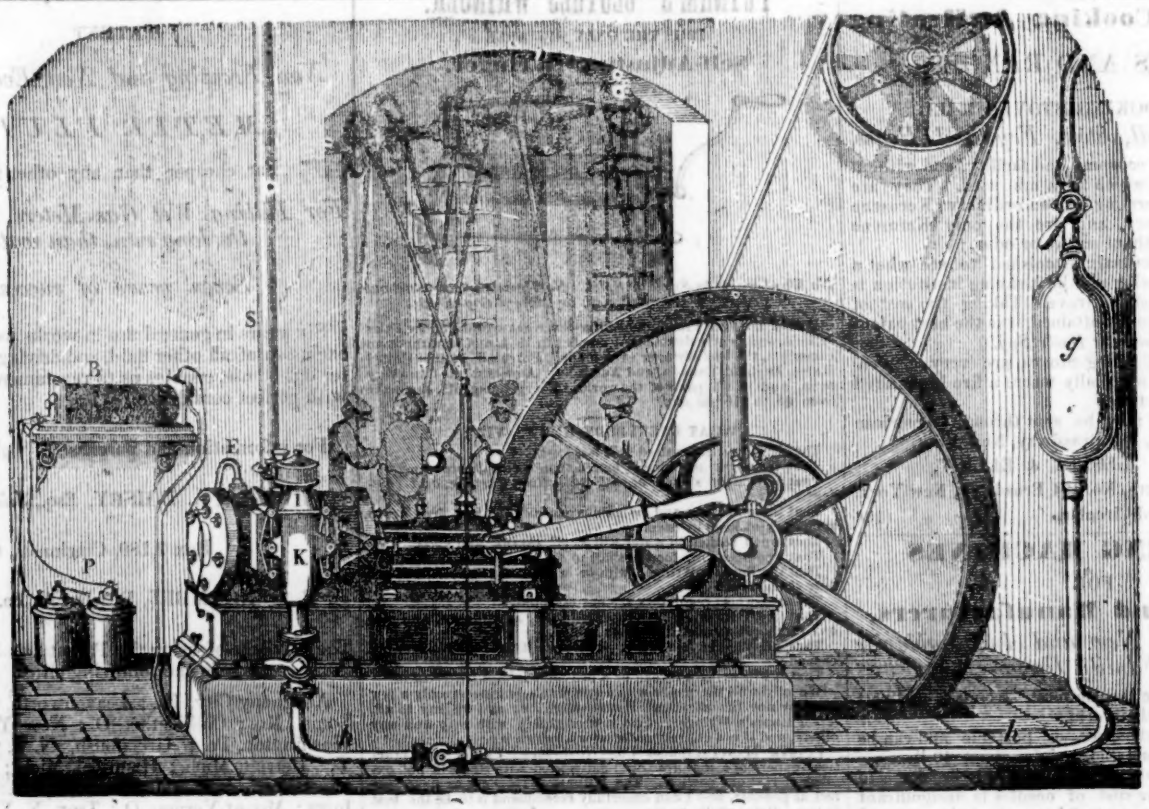
DEBILITY, WEAKNESS, AND PROSTRATION.

Half a wine glass of these "Bitters" three or four times a day, will produce a remarkable healthy change in persons greatly debilitated.

The "Golden Bitters" have been tried and not found wanting. They are put up in our own *Patent* quart bottles, and for sale by Druggists, Grocers, &c., throughout the world. Each bottle bears a fac-simile of the signature of Hubbel & Co.

GEO. C. HUBBEL & Co, Sole Proprietors
CENTRAL DEPOT, American Exp. Building, New York.

THE GOLDEN BITTERS.—We are not an advocate of stimulants of an alcoholic character; indeed we deprecate this "daily tonic" idea—this "morning toddy" which we see offered in all sorts of shapes as a recuperator, invigorator, revitalizer, &c. As a rule all artificial stimulants are dangerous remedies, and must be taken into the system as you would mercury or arsenic, in very small doses. But we have had an opportunity to try the now well-advertised article known as Hubbel's Golden Bitters, and are frank to say that where the system needs building up, where a stimulant is required to aid nature in restoring a lost appetite and infusing a vigorous action to the debilitated functions, we can recommend these Bitters. Hubbel's Golden Bitters are evidently intended to improve the debilitated human system, rather than to tickle the palate, and are, therefore a harmless and safe remedy keep in the house.—*New York Weekly Day Book.*



MOTEUR—LENOIR.

LENOIR GAS ENGINE.

This is a horizontal engine, in which a piston, by a connecting rod drives a horizontal shaft.

The gas enters by the pipe "h" from the regulating reservoir "g," (made of vulcanized india rubber,) which regulates the feeding and the branches connected with the gas-pipe.

The tube, K, receives the gas conveyed by the pipe "h," and conducts it to the valve, which opens and closes alternately, by means of a rod moved by an eccentric wheel fastened to the end of the shaft.

Two of Bunsen's piles, P, sufficient to produce the electricity are placed at a little distanc from, and in communication with a Ruhmkorff electric apparatus, B. The electric current of this apparatus is conducted by means of insulated wires to the electricity distributor "m," placed on the front of the frame, while the current of electricity and its arrival at the inflammator, inserted at each end of the cylinder, is directed by the movement of the piston-rod, which, by an ingenious combination, impels a small movable slide before the distributor.

The burnt gas, after having performed its functions in the machine, escapes, by means of a valve, through a pipe, S, and the water designed to cool the interior of the cylinder enters through a double passage, by means of a pipe situated near the escape-valve, and goes out by the pipe, E.

A two horse and a half horse Engine are now in practical operation at the Dry Dock Iron Works, No. 435 East Tenth street, near East River, New York, where they are being manufactured, and those interested are invited to call and examine them.

THE LENOIR GAS ENGINE

Requires no Fire and makes no Smoke,

No Noise, no Dirt, and is thoroughly safe.

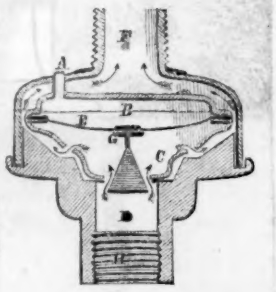
It is propelled by the expansion of Air, dilated by the combustion of Gas within the cylinder, ignited by the

ELECTRIC SPARK

NOTICE TO GAS COMPANIES AND GAS CONSUMERS

THOMPSON'S PATENT GAS CONTROLLER,

The only Self-Acting Gas Controller, Regulator, and Burner Combined which has ever been invented, or known to science.



THE PRINCIPLE UPON WHICH THE THOMPSON'S AUTOMATIC GAS CONTROLLER works is one well known to mechanics, and is simple in its operation.

Within the circumference of a small cylinder below the burner is placed a conical valve attached to a movable diaphragm. The diaphragm rises or falls as the pressure of gas from the pipe is lesser or greater, and the valve acts upon the valve-seat with such regularity of movement that in a difference of from five-tenths of an inch pressure to five inches the variation in flame is hardly perceptible.

The simplicity of its machinery and the nature of the material used in its construction insure its regular action and durability.

In consequence of the uniform quantity of gas which passes the Controller to the burner, there is no waste, and a steady, soft flame is produced, which is important to all who read, write, or work by gas-light. The unsteady flickering blaze which invariably exists when the pressure of gas is beyond the requisition for consumption, has injured the sight of thousands who have been subjected to it.

For street lamps these Controllers are especially valuable, because the pressure varies materially during the night, and in consequence there is a waste of gas, and the light variable.

Improvements have lately been made in the mechanism of the Controller which makes them almost a perfect meter to each burner, and they are now offered to the public with more confidence than ever before.

Reference is permitted to the following named gentlemen—

Col. CHAS. ROOME, President Manhattan Gas Company, N. Y.
C. H. SAND , Esq., President Metropolitan Gas Company, "
J. H. ADAM, Esq., President New York Gas Company, "
PETER COOPER, Esq., Cooper Institute, "
JOHN A. DUFF, Esq., Olympic Theatre, "
GEO. H. KITCHEN, Inspector of Gas Meters, N. Y
A. L. BOGART, Esq., Gas Engineer.
Col. J. A. SABATTON, Engineer Manhattan Gas Company.
Col. A. J. WHITE, Engineer Metropolitan Gas Company.
J. K. SIMPSON, Esq., Engineer Cooper Institute.

Persons interested are invited to call at the Office, 111 Pearl street, where they can see the operation by pressure guage and test meters

M. L CALLENDAR, Agent
Office, 111 PEARL STREET.

THE AMERICAN METER CO.

Organized under the General Manufacturing Laws of the State of New York.

SAMUEL DOWN, PRESIDENT. HENRY CARTWRIGHT, VICE PRESIDENT. RICHARD MERRIFIELD, SECRETARY AND TREASURER

TRUSTEES.

SAMUEL DOWN, WILLIAM HOPPER, R. H. GRATZ, HENRY CARTWRIGHT, RICHARD MERRIFIELD.
THOMAS C. HOPPER, *Superintendent at Philadelphia.*

This Company is now prepared to furnish WET AND DRY GAS METERS, STATION METERS, GOVERNORS, PRESSURE INDICATORS & REGISTERS, SERVICE and METER COCKS, and all other articles in their line appertaining to the use of Gas-Works.

The combination of Mechanical and Scientific Skill, and the long experience of the several members of the Company, is a sure guarantee of durability, accuracy and excellence of workmanship. Orders addressed

AMERICAN METER COMPANY,

512 West Twenty Second Street, New York. Arch and Twenty-Second Streets, Philadelphia. No. 23 West Street, Boston will meet with prompt attention.

Harris & Brother, Practical Gas Meter Manufacturers,

Continue, as heretofore, at their old Establishment, No. 1117 CHERRY ST., PHILADELPHIA, to Manufacture WET AND DRY GAS METERS, and all kinds of GAS APPARATUS, and furnish all articles appertaining to the use of Gas Works. ☞OUR WORK WARRANTED—Satisfaction Guaranteed. Orders respectfully solicted, and promptly attended to, by

HARRIS & BRO., No 1117 Cherry st., Phila.

Messrs. Harris & Brother,

Philadelphia Gas Works, February 14, 1857.

Dear Sirs;—I take great pleasure in stating that we have found your meters to register with entire correctness, and to be generally of very good quality; the number furnished by you to these works is over 5,000.

JOHN C. CRESSON, Engineer.

Office of the Gas Light Company of Augusta, Ga., March 6th, 1858.

This is to certify that having used meters manufactured by Messrs. Harris & Bro., for the last nine years, we do not hesitate to state they have given entire satisfaction in point of workmanship and accuracy of registration; they are surpassed by none, and equaled by few mrnufactories in the Union; we have used meters made by other establishments, but our preference is in favor of those made by Harris & Bro., of Philadelphia, Pa.

G. S. HOOKEY, Superintendent of the Gas Light Company of Augusta, Ga.

Philadelphia, March 4, 1858.

Messrs. Harris & Bro., Philadelphia.

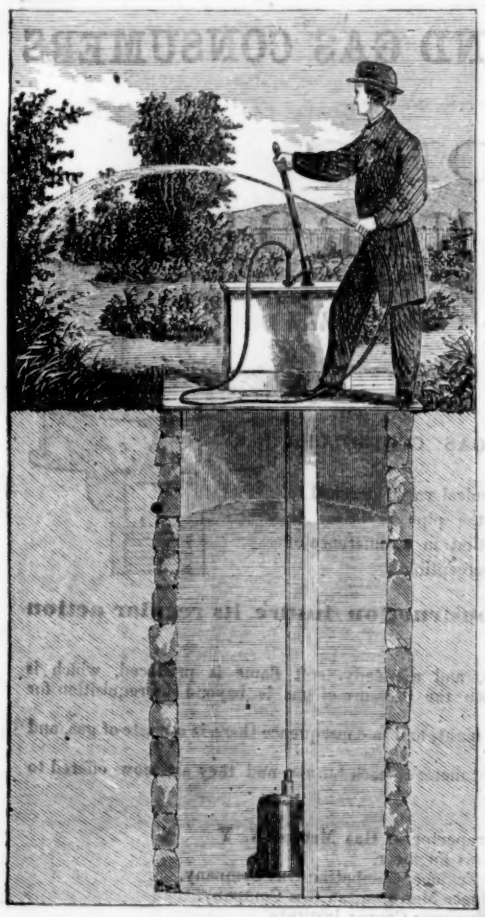
Gentlemen—We take great pleasure in bearing our testimony to the very superior character of the meters we have received from your establishment. We have always found the workmanship all we could desire, while the accuracy and reliability of their measurement have always been satisfactory. We have used meters made by other parties, and none have given as entire satisfaction as those received from you. We are, gentlemen, very truly yours, BIRKINBINE & MEARS.

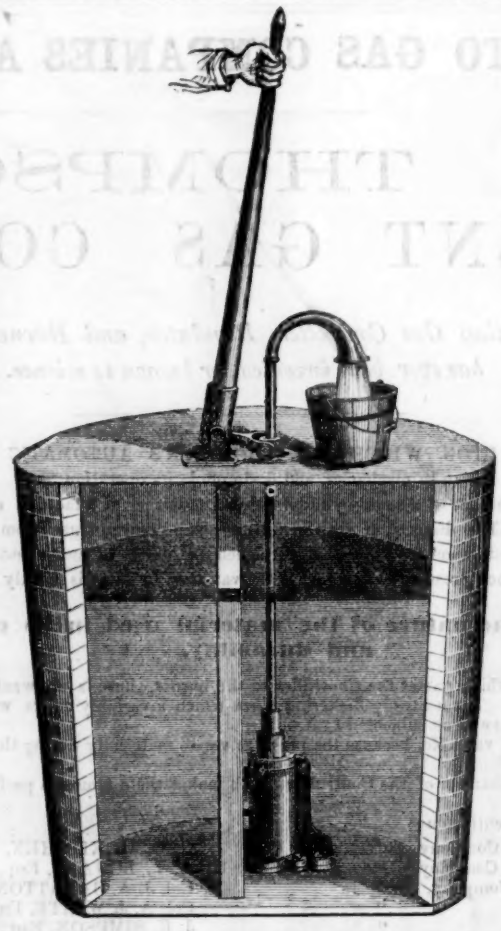
March 14, 1857.

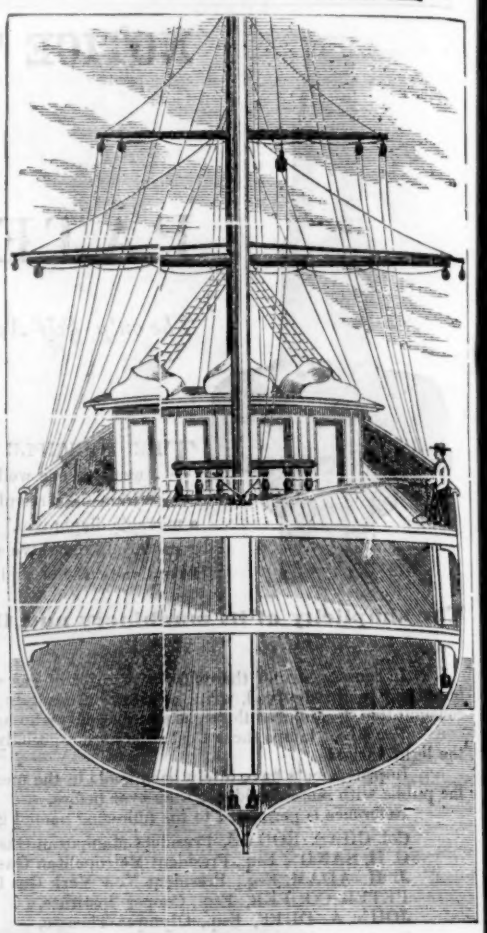
Messrs. Harris & Bro.

Gentlemen—For the last ten yeaas we have used in the Philadelphia Gas Works, meters made in your factory and take pleasure in expressing my opinion to their correctness. On several occasions I have taken your meters apart, and found the materials used in the manufacture of the same to be as fine quality as used in those imported from Europe, or made by any of the manufacturers in the United States. Respectfully Yours, GEORGE W

Inspector of Gas Fittings, Philadelphia







THE AMERICAN SUBMERGED PUMP,

OWNED BY THE AMERICAN PUMP MANUFACTURING CO., NEW YORK.

OFFICE, No. 40 DEY STREET.,

ITS ADVANTAGES.

This valuable Invention, now first intooduded, will, it is believed, supersede all clases for any purpose in use at the present time.

FIRST.—SIMPLICITY. The entire pump is composed of but six parts, all of cast-iron, which can be put together by any mechanic.

SECOND.—DURABILITY. From the fact that it is always submerged, it is perfectly lubricated, and requires no packing As no water can remain in the pipe when not in motion, there is no danger of freezing.

THIRD.—CAPACITY. It is contended that, for the power applied, this Pump excels all others. The No. 1 (the smallest size,) of this Pump, with the power of one hand, has a capacity of thirty gallons per minute, and will throw a stream seventy feet in the air.

FOURTH.—CHEAPNESS. For economy, this Pump surpasses all others, its first cost being about one-third less than that of other Pumps of the same capacity, and being much less both in size and weight, there is a great saving in transportation.

ITS USES.

FIRST.—For a House Pump; the smallest size of the patent Submerged Pump is sufficient for all family purposes. Placed in a well or cistern, water may be conveyed to every room in a common sized house.

SECOND.—For a Farm Pump; for all purposes connected with irrigating, watering stock, etc., etc. This Pump can be placed in running streams, ponds, bayous, etc,, and water conveyed to any required distance.

THIRD.—For a Ship Pump; Any ship owner or captain, with short experience in the use of this Pump, will give his unqualified approval for ship purposes, either to be used as a bilge pump simply, or for washing decks, etc. From its simplicity, as a bilge Pump it will be found entirely free from choking, and will clear grain, dirt, stones, etc., with ease.

FOURTH.—For a Factory Pump, or for air in Oil Wells, for Breweries, or for pumping acids, hot liquors, etc., it is invaluable. It cannot be affected by any liquid.

FIFTH.—To all Directors and Officers connected with mining interests, the PATENT SUBMEAGED PUMP presents great advantages.

The experience of the last five years have clearly proved at what great expense, both in first cost and freight, it has been necessary to be at to secure the proper means of expelling water from the mines, quarries, etc. With this Pump an immense saving is effected in both instances, as in first cost it is much less than other Pumps of the same capacity and power.

Its princeple is that of a Double-acting Force Pump, with a heavy double-acting piston cast in one piece, and a double-acting iron valve within the same, without the use of leather valves or any packing whatever.

RECOMMENDATIONS.

Office of the American Ship Building Company, New York, Oct. 24, 1864.

I am very much pleased with the economy and simplicity of the American Pump, which I have examined with much interest. IT IS ADMIRABLY ADAPTED FOR SHIP PURPOSES, and from its GREAT POWER would do incalculable service in the event of LEAKAGE. It also works well in pumping, where the cargo consists of grain in bulk, and is free in its action.

AUGUSTUS WALKER, Marine Constructor.

New York, October 26, 1864.

To the American Pump Manufacturing Co.:

I have examined with much interest the working and results of the Double Action Force Pump which you are introducing in the market. For use as a Ship Pump and for Mining purposes, I consider it of great value, the results far exceeding anything of the kind presented to my observation, particularly for its GREAT POWER and SIMPLICITY. It will give me pleasure to recommend its introduction into the Navy. Please deliver as soon as possible the Pumps ordered by me last week, for the Mines of the Middlefield Fire and Building Stone Company of Massachusetts, and oblige, Yours, respectfully, CHARLES B. STUART, Consulting Engineer, U. S. N.

Office of the Neptune Iron Works, New York, February 6, 1865.

the American Pump Manufacturing Co.:

I was very much impressed in examining the Pump manufactured by your Company. The originality of the design is in good keeping with its simplicity of construction—certainly very desirable qualities in all mechanical combinations. The extensive demand is the best proof of the popularity and favor it is receiving from the public. I have no hesitancy in recommending it to the inspection of those wishing THE BEST PUMP in the country.

CHARLES HUBBARD, Jr.,
Superintendent.

Office of Donald McKay,
East Boston, Aug. 15, 1865.

Alvin Walker, Esq., Sec. American Submerged Pump Co

DEAR SIR:—In answer to your request for my opinion of your Patent Submerged Pump, will say, that for simplicity, compactness and durability, it has the appearance of being the BEST mechanical combination I have seen, having fitness combined with its simplicity, making it SUPERIOR to Pumps now generally used for general purposes on land. Also, well suited as a Ship Deck Pump, and, in my opinion, can be arranged to be readily used as a good Bilge Pump for Ships.

Yours truly,
HRMAN WINTER

CAMP PAROLE, ANNAPOLIS, Md., April 22, 1865.

Wm. Numson, Esq., President, Baltimore:

DEAR SIR,—The No. 2 Pump has been properly adjusted, and works to our entire satisfaction Hoping you may be successful in introducing it to the public, we remain,

Very respectfully, yours, &c.,
JONES & CROWLEY.

(Letter from the President of Board of Common Council, City of Boston)

Boston, August 10, 1865.

A. Walker, Esq., Sec. American Submerged Pump Co.—

Dear Sir—In reply to your request for the results of the trial of one of your Pumps, I will briefly state the purpose for which it was needed, and the complete satisfaction attained. It was desired to clean out a well 42 feet in depth, in which there stood 10 feet of water; I had previously vainly tried several methods, in one of which one large Force Pump and as many buckets as could be used, succeeded in 10 hours in reducing the depth of the water to 9 feet, but beyond that nothing could be gained. I then put in one of your smallest Pumps, which drained the well completely in Six Hours: although the spring which fed the well yielded a stream of water about as large as a man's arm. I need not say that I consider the Pump fully capable of accomplishing what you claim for it. Yours truly, W. B. [illegible]OW